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The Great Hush-Hush.

IT IS rumoured that there is to be an Exhibition of British Chemical Plant from July 13 to 18 at the Central Hall, Westminster. Yesterday we received a catalogue of exhibits at the British Chemical Plant Exhibition to be held on the same date, but we looked in vain for any indication as to where it is to be held. The only address given prominence is 166, Piccadilly. Are they by any chance the same? We have waited for public and official announcements, but none have come to our notice, and, naturally, we ask ourselves, as others have asked us, why all this air of mystery and gloomy silence?

We have never met anything in the way of exhibitions quite like this one. There are strange tales going round of flying girders, of columns that change their size and place, of floor spaces that are there one day and gone the next and wax and wane in uncanny fashion. This, of course, is highly disconcerting to those matter-of-fact chemical plant builders who have been brought up on the belief that once a space has been measured as, say, 12 by 14 ft., it always remains as such (neglecting earthquakes and the like), and that it equals 168 sq. ft. But our own belief in the immutability of things has been shaken by what we have heard of astonishing daily changes in dimension and position. It is almost like trying to arrange a machinery display on quicksands. We have tried applying the Einstein theory and half a dozen other theories, but none of these seems able to explain the phenomena.

Exhibitors are wondering how they are going to get their plant into the fantastic building (assuming it *is* The Central Hall), and, even if they succeed in doing so, where they are going to put it, and whether they can count on finding it in the same place two days running. It is indeed rumoured that there may be no bar and, even if room can be found for it, that it may disappear overnight and reappear in some place where no one would think of looking for it. We have also heard it whispered that a sort of "phantom of the bar" may be expected to hover over the scene on the stroke of ten and, accompanied by nerve-racking howls of distress, will disappear into one of the milk cans in a remote corner.

However, dismissing these as mere imaginings of bewildered exhibitors, we have been faced with abundant evidence of defective organisation. Also, the catalogue itself is not above reproach and does not do justice to the exhibitors, in that numerous instances may be found of faulty and incomplete cross references. Thus, G. A. Harvey and Co., Ltd., is noted on page 19 as manufacturing drying plant, but this is not indicated under the five heads of Dryers in the Classified List of Exhibits. J. Harrison Carter, on page 18, are given as makers of disintegrators, but the only reference under the heading of Disintegrators in the list is to the Hathern Station Brick and Terra Cotta Co., Ltd., who do not mention these machines on page 19. No reference is made in the list to Thomas Broadbent and Sons, Ltd., under the heading of Extractors, Centrifugal. George Scott and Sons, Ltd., are not referred to under the heading of Dryers, Pumps, Mills, or Evaporators. Wm. Gardner and Sons, Ltd., are not indicated under the heading of Mills and Sprayers. In connection with aluminium plant, there is no reference at all in the list to this, which must be rather disappointing to The Aluminium Plant and Vessel Co., Ltd., and, moreover, they are not noted under the headings of Monel Metal and Stainless Steel.

New Machinery.

In this issue will be found notes on new developments in plant and machinery, exclusive of packing and canning equipment, which are reserved for special issues on these subjects.

As Mr. Hugh Griffiths points out in an illuminating article appearing in the August issue of MANUFACTURING CHEMIST, although manufacturers are at the present time somewhat cautious in investing in new equipment, the progress in technique has been so rapid that it is essential to watch developments very closely in order to maintain a competitive position.

At the present time a severe competition in all branches of the engineering trade has created an opportunity, which is not likely to recur, for the food manufacturer to provide himself with new equipment at an unusually low cost.

Plant Materials.

Although the universal corrosion-resisting metal is not yet with us, it must be recognised that chromium steels, chrome-nickel steels, pure nickel, and monel metal have become definitely everyday materials of construction. These metals have excellent qualities if correctly chosen and applied, but knowledge and experience are required. An important point is that of fabrication; great care is necessary in the manufacture of vessels in the chrome-nickel steels—welded or riveted—if the advantages of these alloys are to be secured. One advantage of pure nickel is that it can be hammer welded.

Vessels in aluminium which have to resist corrosion are now generally made by the hammer welding process to produce really sound welds.

The use of silver in chemical plant has not increased so much as might have been expected, notwithstanding the present low price and the many excellent corrosion-resisting properties of this metal.

Among the non-metallic materials of construction the increasing tendency to employ rubber, ebonite, and synthetic resins is noteworthy. For resistance against non-oxidising acids these materials are almost indispensable. Of special interest are the new materials which contain unvulcanised rubber, the use of rubber linings to resist abrasion, and the new possibilities of electrically deposited rubber.

Drying and Distillation.

In the design of equipment for heat exchange, evaporation, drying, and distillation, the tendency towards a more accurate appreciation of the fundamental principles underlying heat transfer is apparent, with the result that many mistaken ideas in plant design have been exploded. Even in plants for small outputs the proportioning of heating and cooling surfaces is more carefully done than formerly.

The recognition of "film resistances" in heat transfer, and consequently the economic value of turbulent flow, has led to changes in the design of coolers, condensers, evaporators, and similar installations.

In evaporation processes the forced circulation evaporator and the vapour recompression evaporator have definitely established themselves.

Drying is a difficult operation, too often carried out carelessly in unsuitable plant. With the accumulation of technical experience greater discrimination in the choice of suitable equipment, as well as in the adjustment of the physical conditions of drying, is being exercised.

Both vacuum drying and spray drying are steadily gaining ground. The latest installations of the latter are improved in design in many respects so that effective control over a delicate and difficult drying operation can now be obtained.

Mixing and Filtration.

We are reminded that agitation as generally employed has in many cases to produce increased surface contact, and the application of similar principles has led to distinct improvements in the design of reaction vessels, extraction agitators, and the like. The whole subject of agitation and mixing is, however, a complex one, and the requirements are too varied to be satisfactorily met by a few standardised types, and it is better to design such equipment specially for the particular purpose.

Filtration plant is showing a marked improvement, and manufacturers are now able to select a large number of different types of construction. The most obvious tendencies are the extended application of continuous rotary filters, leaf filters, and edge filters.

Modern Tendencies.

It is becoming more customary to attach adequate importance to the correct proportioning and design of well-established forms of apparatus rather than to chase after the latest untried novelty.

It is now more fully realised that the best results in the operation of plant can only be secured if accurate physical data are available to the designers. Only a few years ago the food manufacturer, in purchasing equipment, was far too often embarking on a very costly experiment. Now, much that was doubtful and incalculable has been eliminated.

The suppliers of plant are now more able to appreciate the real requirements, and have not hesitated to investigate scientifically the performance of their equipment, and are therefore in a position to give better service than ever before.

A New Table Cereal.

The use of wheat germ in foods for human consumption is not new, and, as is well known in the trade, it is incorporated in certain proprietary flours in addition to several foods, of which it is practically the sole constituent. Hertwig, the secretary of the Committee on Foods of the American Medical Association, has recently written two articles which

appear to give the first published information on the subject. The first deals with toasted germ as a possible merchandisable table cereal. The germ is toasted to a light brown (120 to 130° C.), and after such treatment it has a pleasing nutty flavour and almost loses the pea-like flavour of the raw germ. We have eaten mildly toasted wheat germ as a breakfast food for a long time and can vouch for its palatability, whether taken with milk, jam, or stewed fruit. It can also be used as a nutritive decoration for cheese concoctions, scrambled eggs, or cutlet garnishing. The germ toasted at 130° C. to a brown colour will keep several months. In the second article a wheat germ self-raising flour is suggested and a formula is given. We have tried out this formula, but scones made from the finished product were not a success, being distinctly acid in flavour and rather heavy. With certain modifications of the ingredients used a more satisfactory result is obtained. The writer states that practically all the wheat germ milled is used for animal feeds. That may be the case in America but not in this country. Large quantities of wheat germ are used for certain brown breads, and we believe that the proprietary article "Bemax" contains the germ treated by a special process. The two papers referred to are, however, suggestive of further outlets, and no doubt bakers and confectioners will find them of personal interest.

Evaporation in Flour.

Once more the minions of the law are busy with the administration of the Sale of Food (Weights and Measures) Act. A Scarborough grocer was summoned on May 8 for selling 25 bags of flour, 24 of which were short weight. In 150½ lbs. the shortage was 12 oz. ½ dr., or about ½ per cent. The magistrates found the case proved, but in view of defendant's previously good character and his solicitor's argument, dismissed it under the Probation of Offenders Act on payment of costs. The solicitor pointed out that the weather was very wet when the flour was packed and subsequently the weather became hot and dry. It may be recalled that on July 28, 1928, a Luton grocer was convicted for selling flour short of weight, in one case to the extent of 4 per cent. The conviction was appealed against successfully, the appeal being won on the results of the work of Fairbrother (*Cereal Chemistry*, vol. vi., pp. 379-395), who, in a chamber in which the humidity and temperature could be controlled, reconstructed the atmospheric conditions which prevailed at Luton (as recorded at the Rothamsted Agricultural Station) during the time the flour was packed, and proved the loss in weight to amount to over 4 per cent. Other experimental work has shown that flour is capable of considerable variations in moisture content and gains in weight in damp weather. The published scientific results definitely show that a loss of as much as 4 per cent. may be due to unavoidable evaporation, and it seems unreasonable to institute proceedings for a shortage of ½ per cent. Although the defendant was dismissed he had to pay costs, and the case may have an influence on his future trade, since a bad name is harder to lose than to be obtained. The man is penalised for something over which he has no control at all. Sometimes the law really is an ass!

A Great Firm.

On March 4, 1824, John Cadbury, an Exeter man, who had gone to Birmingham, made the following advertisement: "J. C. is desirous of introducing to particular notice Cocoa Nibs, prepared by himself, an article affording a most nutritious beverage for breakfast"; and that was the beginning of the well-known firm of Cadbury.

In 1831 he began the actual manufacture of cocoa and chocolate in Crooked Lane, a manufacture which has survived the vicissitudes of a hundred crowded years. Later on he was joined in partnership by his elder brother Benjamin, and these were the original Cadbury Bros. Early on they realised the importance of window dressing, and in 1849 they gave an exhibition of the various stages in the manufacture of chocolate, cocoa, and chicory at the British Association meeting in Birmingham. In 1852 about a score of girls were employed at the factory in Bridge Street. The hours were 9 a.m. till 7 p.m. with an hour off for dinner. Their earnings varied from five to nine shillings per week. Once a week they were given a half holiday for a country excursion, and twice a week they left off work an hour early to attend evening school.

In 1914 there were some 6,800 employees, who were providing over 700 different lines. The introduction of labour-saving devices for packing, etc., has had such an influence that in 1929, although the trade done was the largest in the history of the firm, the number of employees had been reduced in four years by nearly 3,000. The story of this firm, now a public limited liability company, as told by Mr. Williams in connection with the Cadbury centenary, is indeed full of interest.

Sulphur Dioxide and Vitamin C.

In the November, 1930, issue of FOOD MANUFACTURE reference was made to the work of Morgan and Field in connection with the effect of drying and sulphuring on the antiscorbutic properties of such fruits as peaches. These workers have now extended their researches to prunes and apricots (*J. Agric. Res.*, 1931, vol. 42, pp. 35-45). Their original work showed quite definitely that sulphuring had a distinct protective effect on peaches. Apparently all fruits do not behave in the same way; thus frozen fresh

prunes retained their vitamin C, whereas frozen fresh apricots, packed in cases which were not evacuated, lost it all. If, however, the apricots were packed in cases which were evacuated and then filled with nitrogen before the fruit was frozen, the vitamin was retained. Sulphured, dehydrated, and sun-dried prune products retained the vitamin C of the fresh fruit satisfactorily only when the fruit was dipped in lye before treatment with sulphur dioxide, this probably being due to an increased penetration of the protecting sulphur dioxide. All unsulphured products of both fruits, whether sun-dried or dehydrated, were without antiscorbutic value, and the dehydrated products, both prune and apricot, retained the vitamin C more completely than did the corresponding sun-dried fruit. The dehydrated and sun-dried apricots, containing 450 to 500 parts per million, retained the antiscorbutic property; but with less than this quantity all products lost it completely. An interesting point has arisen out of these researches, and that is that the tendency to loss of vitamin C and A in apricots is greater than in peaches or prunes, and this suggests the presence of powerful oxidative catalysts as well as of tissue oxygen in apricots.

Cereal Proteins and Heat.

The question of whether toasted bread is less digestible than raw bread is one which has been debated on many occasions, but very little experimental work appears to have been carried out to substantiate the various dogmatic statements. Recently Morgan (*J. Biol. Chem.*, 1931, vol. 90, p. 771) has made certain animal experiments which throw some light on the interesting subject. Growth experiments on young rats showed that the protein of cereals, subjected to dry heat or toasting at 200° C. for forty-five minutes or to similar procedures during manufacture, is not well utilised for growth. The addition of 5 per cent. of casein to these toasted diets practically made up the discrepancy between the latter and correspondingly supplemented raw diets, thus indicating that the deficiency lay in the protein fraction of the toasted diet. Experiments with raw and toasted gluten indicated that the toasted protein supports less growth than the raw both absolutely and relatively to the amount eaten. The author emphasises the fact that the digestibility of the toasted proteins is but little different from that of the raw, particularly in the older animals, and the loss of nitrogen occurs in the urine. The change produced by the heat treatment probably therefore lies in the assortment or availability of the amino acids absorbed.

Imports of Fruit and Fruit Pulp.

The Report of the Empire Marketing Board on Fruit Supplies in 1930 contains some interesting facts. The English crops were very heavy, particularly plums, gooseberries, and cherries, which were the heaviest recorded since 1823. Apples and pears, however, were only moderate. The importation of raw fruits reached the big total of 26 million cwts., or over a million cwts. more than in 1929 and 700,000 cwts. more than the previous record of 1926. The value, however (£31,101,000), was £495,000 less. The consumption per head was also a record of 82·8 lbs., and, as one would expect, the chief fruits were apples, oranges, and bananas, of which 24·6, 23·4, and 10·6 lbs. per head were eaten respectively. Imports of preserved fruit from Russia have grown rapidly in recent years, and in 1929 amounted to 53,300 cwts., but in 1930 the total was rather less (45,300 cwts.). The fruits concerned are chiefly apricot, strawberry, raspberry, and black-currant. English growers, particularly of soft fruits, complained bitterly about the heavy importation from the Continent, and the Report in question shows that these imports were very considerable. Thus the importation of pulp from Holland included 151,600 cwts. of strawberries, 44,200 cwts. black currants, 28,000 cwts. raspberries, 24,700 cwts. gooseberries, and 22,900 cwts. plums. Whilst this trade was going on choice Victoria plums were rotting in heaps in Pershore, as the prices they were commanding would not stand packaging and transport.

Science in the East.

Most of us on this side of the globe have little or no conception of the amount of quiet, unassuming scientific research that is being carried out in China, Japan, and other countries of the East. We happen to have before us a list of reports of recent Chinese investigations in one department of science, and it is interesting to quote a few examples, as illustrating the extraordinarily detailed nature of the work. One is a study of the variation in number of hooks on the hind wings of the Chinese honey bee; another gives the results of measuring the tongues of 206 bees. Ch'eng-Chao Liu presents in detail the changes in the digestive system of the frog, *Rana nigromaculata*. Nakajima has compiled a list of spiders of Fukien Province, while Tanaka has contributed a critical review of citrus classification. A dissertation by Hon Nien Fey on the palm and sole prints of the Chinese is most interesting and admirably illustrated. These are merely a fraction of the large output of scientific work—even in a restricted field such as this. Glancing through another volume of reports, covering over 800 pages of small print, we note abstruse discussions on termites, grubs, worms, midges, grasses, etc. It is doubtful if we can produce evidence that would bear comparison. Who says China is asleep?

Emulsification in Food Manufacture

By J. O. SIBREE, B.Sc., A.M.I.E.E., A.Inst.P.

In Part I., published last month, the basic principles of the subject were discussed. In the article below the author proceeds to a description of the various forms of machines typical of the different classes into which emulsifiers and homogenisers may be conveniently grouped.

PART II

Types of Machines or Appliances for Emulsifying and their Applications.

THESE MACHINES may be divided into several distinct types, since the principles involved in their construction differ somewhat.

Emulsification by Agitation.

(A) Shaking, beating, threshing, or whisking machines. These are familiar to most people, and as a rule give only coarse emulsions. The author has used a machine of the beater type which is easily made and gives very satisfactory results. By means of it, emulsions of viscous and limpid oils were obtained in which the particles were from 6μ in diameter and less, a large proportion of the particles being in Brownian movement. The emulsions were remarkably stable, and could be kept for several months without any sign of the separation of oil. The essential features of this machine will be seen from Fig. 1. A motor which could be driven at a high speed was fixed with its axis vertical to a stand. The armature carries a shaft BC, and at C

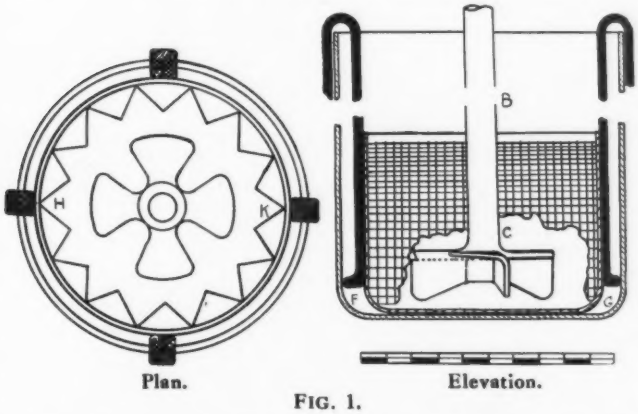


FIG. 1.

there is a propeller, having the tips turned down at right angles and dipping into a vessel of about two litres capacity. In the interior is a second vessel, FG, perforated with holes, and fixed to this is a piece of wire gauze, bent in a zigzag fashion so that the ground-plan is a pointed star. This is shown in plan HK. When the propeller is revolving in the liquids to be emulsified, they are thrown violently against the projections and forced through the interstices of the gauze, thus disintegrating the disperse phase. This beater was first constructed for the regeneration of milk from milk powder and the making of cream from butter and milk powder. Fig 2 shows that quite fine emulsions may be prepared by it (see Sibree, *Trans. Farad. Soc.*, p. 119, 1931). The principle of a high-speed propeller is made use of in the "Hy-Speed" machine manufactured by Messrs. Butlers, Ltd., of London.

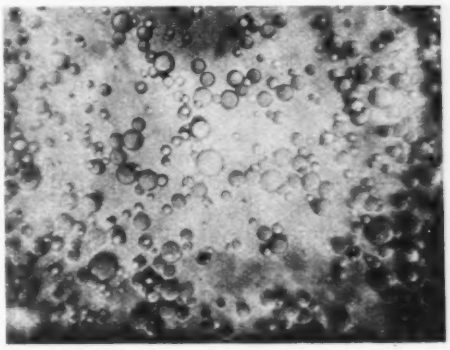


FIG. 2.—Emulsion of Limpid Paraffin in 1 Per Cent. Sodium Oleate Solution in Water. Made in Beater. × 660.

Emulsification by Shearing and Beating.

(B) *The Plauson Mill*, which combines a powerful beating with a shearing action, has never found an important place in the food manufacturing industry. It has, however, been much used in the manufacture of pigments, paints, printing inks, etc. As it was the forerunner of other types, it is worthy of description. It consists of a circular body of cast iron, which is jacketed for heating or cooling purposes. Within the cavity there is arranged a rotating shaft, carrying a number of beaters arranged at eight points round the circumference. These beaters are blades of steel, and are keyed to the shaft with distance pieces between them, the latter being of rather greater thickness than the blades of the beaters themselves. In the body casing of the mill are fixed sets of blades at suitable distances apart, in order that the revolving blades may pass clear between them. The peripheral speed of the blades is of the order of 3,000 metres per second, and as the clearance between the fixed and the moving blades is small, the material to be emulsified is subjected not only to impact but to shearing.

Siemens and Halske's Mill.—This mill is described in a patent by this firm, and is an inversion of the principle used in the Plauson Mill. The liquid is forced through a small orifice or orifices at a pressure of 1,400 to 2,000 lbs. per square inch. Under this pressure the jet of liquid acquires a velocity of the order of 300 feet per second and strikes against a disc. The disc revolves slowly so as to equalise

wear and to prevent undue heating. The great velocity of the liquid on striking the disc has an atomising effect on the disperse phase, and this is enhanced by aerating the material to be emulsified. The principle involved in this mill is used in a modified form in certain homogenisers in order to break up the colonies of droplets. Briggs has devised a simple form of laboratory homogeniser which makes use of the same principle. (See *J. Phy. Chem.*, vol. 19, p. 223, 1915.)

(C) *The Premier Mill.*—This mill effects emulsification by the shearing action which takes place between two smooth surfaces. Fig. 3 gives a clear idea of the principle on which the mill is constructed. The rotor consists of a perfectly smooth metal truncated cone fixed to a spindle SP, which is mounted on ball bearings. The cone works in close relation to a fixed surface CS, which forms part of the casing. A micrometer head enables the clearance between the rotor and the casing to be adjusted so that the actual clearance is from one-thousandth of an inch upwards. We therefore have a metal surface rotating in close proximity to a fixed surface at a speed which may vary from 5,000 to 25,000 feet per minute or more. The material to be emulsified is fed through the inlet I, and little or no head is required, as the rotor acts as a centrifugal pump, since the upper portion of the cone moves at a greater linear velocity

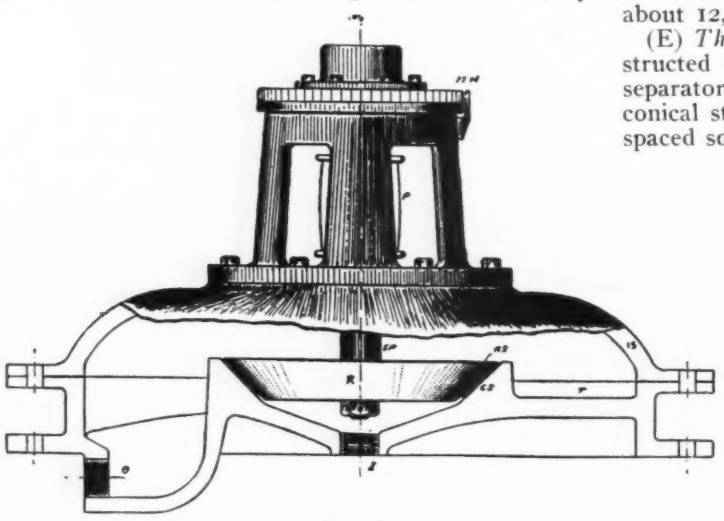


FIG. 3.

than the lower portion. This mill has been applied to a variety of uses—*e.g.*, emulsification, the regeneration of milk from milk powder and cream from butter and milk powder, the making of mayonnaise, the even distribution of water and salt in edible fats, the extraction of fibrous tissues, either with water or solvents, the extraction and washing of oils, extractions from such materials as vanilla beans, cascara, the ageing of perfumes, and the making of various pastes. It has also extensive applications to the paint trade and to preparing inks and also emulsions of asphalt for cold spraying on roads.

(D) *The Circulator* is a mill made by Messrs. Follows and Bates, and works on the high-speed vertical plate principle, in which one plate is fixed and the other revolves at a high speed. The materials to be treated are fed in at a hopper which communicates with the eye of the grinding discs, and the product, after passing between the plates, where it undergoes shearing action, is delivered into an enclosing casing, in which the materials are subjected to violent agitation by the edge of the disc before passing to the discharge valves. The distance between the plates may be adjusted by a micrometer of the worm and wheel type, so that it is possible to have the plates practically touching or at a distance of one, two, or three thousandths of an inch apart. The plates are made either smooth or with various types of grooving to suit the products to be treated. The manufacturers claim that the machine is suitable for food preparations such as soups, mayonnaise, fruit and vegetable pulps, etc.

Ferns' Iron Cow is a mill operating on a similar principle to the above, and is manufactured by the Morton Machine Co. (See Fig. 4.)

Various sizes, from the hand table machine to the larger size used in factories, are produced. They are of the high-speed disc type, the discs being in the form of an inner and outer cone. The liquid is led into the centre of the revolving cone and is thrown out centrifugally through an aperture of two thousandths of an inch. In the smaller machines the disc or cone itself revolves at approximately 14,000 revolutions per minute, and in the larger models at about 12,000 revolutions per minute.

(E) *The De Laval Centrifugal Emulsor* is constructed on the same principle as the centrifugal separator. The essential part consists of a series of conical steel discs, superimposed on each other and spaced so as to leave a very narrow gap in between

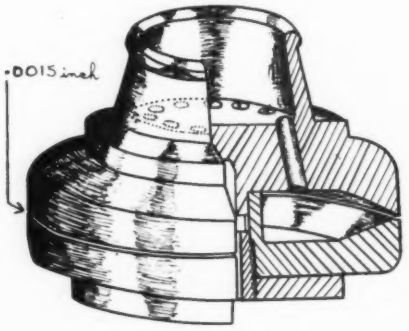


FIG. 4.

succeeding cones. The assembled cones are fixed axially to a cylinder which revolves at a high speed, and the whole is enclosed in a bowl. The materials to be emulsified are fed into the axis of the cylinder and from there they pass by means of ducts to the spaces between the cones. The centrifugal force due to rotation forces them through the narrow gaps between the cones, from which they are thrown out and atomised against the wall of the bowl.

Emulsification by Shearing.

(F) *The Hurrell Homogeniser.*—This machine effects emulsification by causing the ingredients to pass in a thin film between the smooth surfaces of a rapidly revolving rotor and a fixed casing. Thus

there is no beating, the entire process being effected by shearing. The machine consists essentially of a rotor, which has the appearance of two narrow pulleys mounted close together in the middle of a shaft, the latter being carried on ball bearings. The pulley-like rotor revolves in a short cylindrical body, which it almost fits, the space being, in fact, variable at will between three thousandths to three hundredths

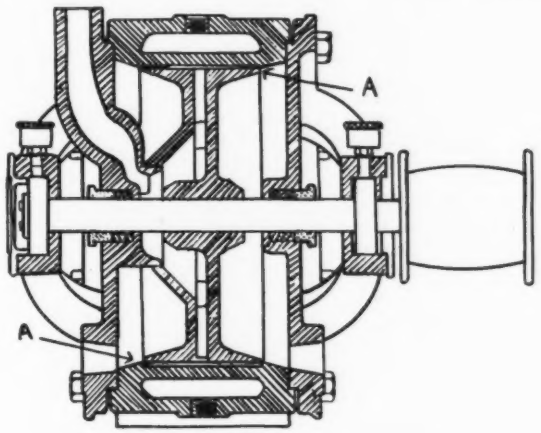


FIG. 5.

of an inch. The materials to be treated are fed into a hopper which is connected with the centre of the pulleys. Immediately the materials touch the rapidly revolving rotor they are flung out radially by centrifugal force, and, being confined within the webs of the rotor, set up a pressure by means of which they are forced into the narrow gap between the inner surface of the stator and the periphery of the rotor. If the materials are fed so slowly that there is practically no radial accumulation, many hundreds of revolutions will take place while the contents of the gap traverse the working face, and they will receive consequently a vastly greater thoroughness of treatment than that effected when the rate of delivery is at its maximum. Fig. 5 gives a diagram of the

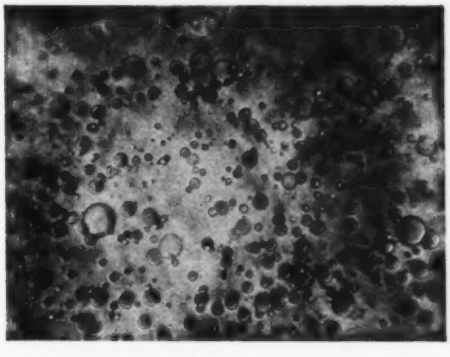


FIG. 6.—Emulsion of Viscous Paraffin in 1 Per Cent. Sodium Oleate Solution. Made in Hurrell Mill. × 710.

machine, which is made in Monel metal or stainless steel, the non-corrodible properties of which ensure the absence of contamination of food products. This mill has many applications to food manufacture and other industries—*e.g.*, the making of mayonnaise, the minute disintegration of solids suspended in liquids, bitumen emulsions for road treatment, the extraction of the essential oils of citrus fruits for flavouring beverages, the disintegration of the insoluble crystals of paste dyestuffs, the making of "washable" wall paints or distempers.

The manufacturers claim that over one-third of a million tons of emulsions were made by these

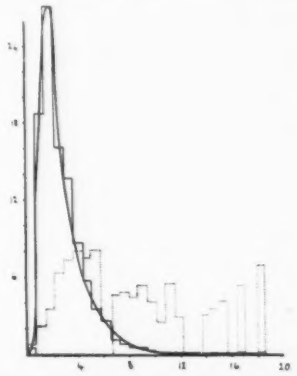


FIG. 7.—Emulsion of Viscous Paraffin made in Hurrell Mill. Size and Volume Distribution of Drops. Ord. N Per Cent. and V Per Cent. Absc. Diameter of Drops in Microns. Full Rectangles N Per Cent. Dotted Rectangles V Per Cent.

machines during last year. Fig. 6 gives a photomicrograph of an emulsion of viscous paraffin in a 1 per cent. solution sodium oleate in water prepared in one of these mills. The table on p. 174, Sibree, *Trans. Farad. Soc.*, 1931, gives a statistical count of the particles, which is illustrated by the curve Fig. 7 which is of the "cocked hat" variety.

It will be noted that in the cone or disc type of machine the materials are fed in at the centre of the rotating part and are thrown to the periphery by centrifugal force, but in the Hurrell type of machine this is not so. The speed at which the materials pass through depends entirely on the rate of feed. Hence the fineness of the emulsion depends on the speed of feeding and the distance of the rotor from the casing, and this can be adjusted while the machine is working. If the feeding is slow, then the materials pass many times round the film gap before being discharged, and an examination of the particle sizes under the microscope will readily determine the optimum rate of feed and the best distance for the rotor. It is possible in size No. 1 machine to pass from 10 gallons to 1,000 gallons per hour through the machine. This is surprising, considering the size of the machine and the small amount of power used.

The Defiance Emulsor (made by Messrs. Nathan and Co.) works on the principle of using centrifugal force to atomise the materials to be emulsified or to reconstitute milk from milk powder or prepare cream from milk powder and butter. (See Fig. 17.)

The essential part of the machine consists of a long narrow vertical cylinder, which can be rotated at a high speed, and furnished at the base with radial flanges.

The liquids to be emulsified are led into the cylinder at the bottom, where the flanges help to complete the mixing and give the liquids a high velocity of rotation. At the top of the cylinder is

a number of fine holes through which the liquids are forced at a high velocity and thus atomised them completely. The rotating cylinder is contained in a bowl from which the emulsion is collected.

The materials to be emulsified are first thoroughly mixed in a feed tank containing a paddle of the propeller type.

High-Pressure Homogenisers.

In this type of machine the materials to be emulsified must first be converted into a coarse emulsion by shaking, mixing, or some other method. The emulsion is then forced through the very fine opening of a valve by means of a high-pressure pump. The introduction of this type is largely attributable to the French inventor Gaulin, who produced the first of these machines some forty years ago with the object of homogenising milk, and this machine is extensively used all over the world.

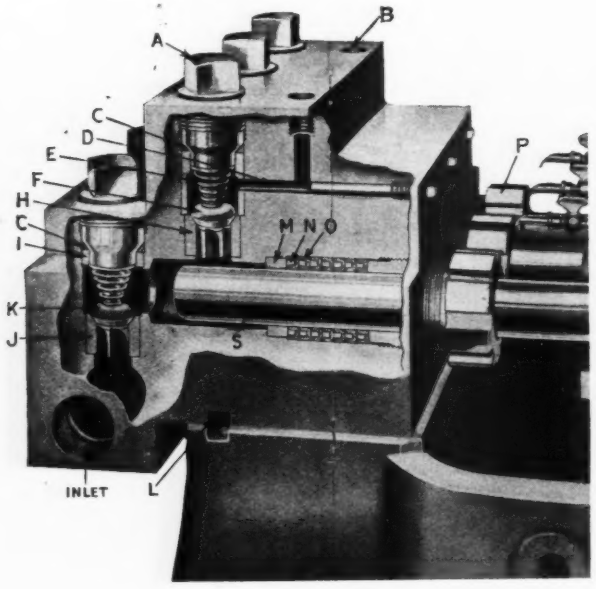


FIG. 8.

As an example of this type of machine we may take the Viscoliser, which is illustrated in Fig. 8. S is a reciprocating plunger pump, and when this moves from left to right the coarse emulsion is drawn in at the inlet, the reduction in pressure being sufficient to raise the valve K. When S moves from right to left, the inlet closes and the emulsion is forced past the "homogenising valve" F. This is a conical valve of hard alloy steel, very carefully ground, and kept closed by a spring until the pressure rises to about 2,000 lbs. per square inch. When the pressure is at this value, the valve is forced open very slightly and the emulsion passes through the narrow space, thus subdividing the globules of oil and giving an emulsion with remarkably fine particles.

In order to give continuity of flow, the apparatus has three pumps working from cams set at 120 degrees to each other. To cope with the very high pressure used in the process, the cylinder block shown in the diagram is cut from a solid block of alloy steel, and the inlet and outlet ports, the valve chambers and plunger chambers, are all bored out of the solid block.

Fig. 9 gives photomicrographs of an emulsion of viscous B.P. paraffin in water containing 1 per cent. sodium oleate, and the table below gives the size distribution of the particles. Fig. 10 illustrates these figures by a curve which is of the J. variety.

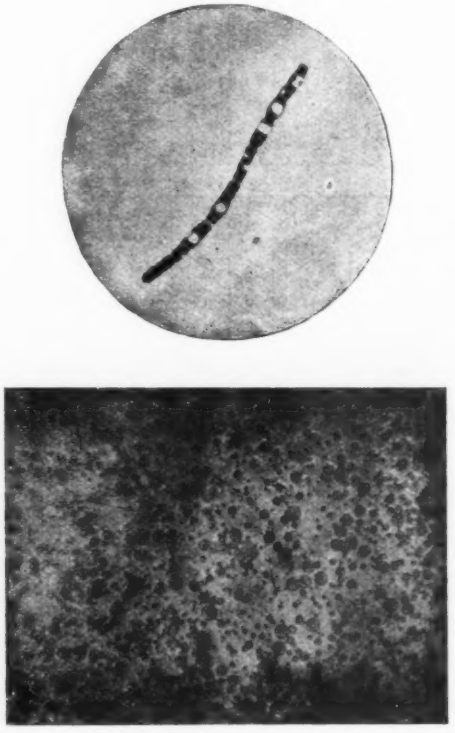


FIG. 9.

Above: "Bacillus anthracis," 15 μ in Length. × 2,560. Below: Viscous Paraffin in 1 Per Cent. Sodium Oleate Solution. Made in Viscoliser. × 660. About 75 per cent. are below $\frac{1}{2}$ μ. Compare with size of bacillus shown above.

(Barnard and Welch, "Practical Photomicrography." Published by Edward Arnold.)

SIZE DISTRIBUTION OF PARTICLES IN AN EMULSION OF VISCOUS PARAFFIN IN 1 PER CENT. SODIUM OLEATE SOLUTION. MADE IN THE VISCOLISER. (MAGNIFICATION 515.)

D (Microns).	*N*.	*N* Per Cent.	*V* Per Cent
0·486	1476	75·5	3·3
1·46	365	18·7	22·2
2·43	90	4·6	25·1
3·40	14	0·7	10·5
4·37	7	0·4	12·7
5·34	3	0·2	11·6
6·31	0	0	0
7·28	1	0·1	14·7

Further examples of machines working on the same principle are as follows:

The Alfa-Laval Homogeniser.—This machine is

of the high-pressure type, as will be seen from the diagram. The pressure exerted by the pumps is stabilised by means of an air chamber. The homogenising valve is of different construction to that in the viscoliser, and is controlled by direct pressure; it has no spring control. The valve and its seating are cylindrical in shape, and this design was adopted in order to make the path of the particles, during homogenisation, as long as possible. (See Fig. 11.) *The Colony Two-Stage Homogeniser*, illustrated in Fig. 12. *The C.P. Homogeniser* (Wm. Storer, Ltd.), illustrated in Fig. 13. *The Schroder Homogeniser* (Messrs. Ringe and Kuhlmann, Hamburg).

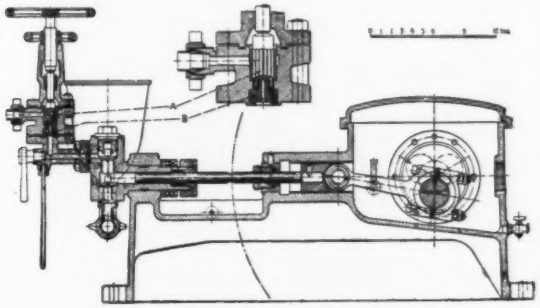


FIG. 11.

Gardner's Homogeniser (Messrs. Gardner and Sons, of Gloucester), illustrated in Fig. 14. Another machine belonging to the same category is the *Hurcol Emulsifier* (Messrs. Harben and Co.). This is really a high-pressure homogeniser, and is a most ingenious adaptation of the principles used in this type of machine. Fig. 15 shows a vertical section of the emulsifier. The materials to be emulsified are placed in the vessel A, which is furnished with a mixer by means of which a coarse emulsion is produced. B is a plunger pump, and when this moves from left to right the material is drawn from A by means of the non-return valve C. When the piston moves from right to left, the liquids are trapped in the bottom of the cylinder until the pressure becomes so great that they are squeezed between the plunger and the bore of the cylinder. Thus the pump and homogenising valve are combined in one. Circular grooves are cut in the plunger along its entire length. Due to the very high pressure and the small space through which the liquids are forced, the mixture flows at a very high velocity, and the emulsifying action is exactly the same as in an homogenising valve. The grooves act as reservoirs in which the emulsion is thoroughly mixed and broken up, and this proceeds all the way up the plunger.

The emulsion finally reaches the larger annular space D, and from this it leaves the cylinder by means of the discharge valve E.

In the smaller types the bed of the machine can be clamped to a table, and the plunger is worked by means of a long handle F pivoted at G and connected to the plunger at H.

It will be seen that the point H moves in the arc of a circle, and to allow for this the cylinder is pivoted at K.

These machines are made in various sizes, from the hand-operated type of one pint capacity to the power-driven machine of five gallon capacity.

Mechanism of Emulsification.

In most of the machines mentioned the gap or film in which emulsification takes place is of the order of one thousandth of an inch or greater—*i.e.*, is of the order of 25 μ or greater—yet emulsions are produced in which the size of the particles is 1 μ

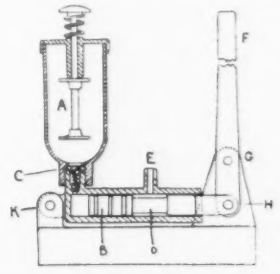


FIG. 15.

or under, and one naturally wonders how this comes about.

If we consider the film of materials in, say, the Hurrell machine and imagine that the oil is already broken up into drops of diameter comparable with the width of the gap, then the mechanism of the emulsification is probably as follows: One wall of the gap is at rest, while the other wall is in rapid motion, hence the liquid between is subjected to violent shearing and a drop of oil is drawn out into a cylinder. Such a cylinder of liquid is unstable when its length is greater than its circumference, and it tends to break up into drops (Fig. 16). One only has to think of the way in which a jet of liquid breaks up into drops to understand this. The same kind of argument will apply to the valve type of homogeniser (the Gaulin or Viscoliser). In this case the walls of the gap are stationary, but the liquid is forced through the gap at a high speed and is again subjected to shearing.

The actual mechanism of the process is probably not at all so simple as this, since we know from the experiments of Osborne Reynolds that at moderate velocities a liquid moves parallel to the walls of the tube or gap through which it is flowing; but if the velocity exceeds a certain critical value, then the flow becomes turbulent. Taylor in some more recent work (*Phil. Trans.*, Series A, vol. 223, 1923) has shown that in the case of one cylinder rotating co-axially inside another (this would apply to the Hurrell Mill) the turbulence of the liquid is of a very complicated character, and consists of a series of vortices, which may be described as having a three-dimensional outward radial flow, occurring at intervals along the cylinder. But this also points to the fact that the liquid is being violently sheared, and under these conditions it is reasonable to suppose that the drops of oil are drawn out into cylinders and that these in turn break up into smaller drops, thus giving the fine emulsions provided by these mills.

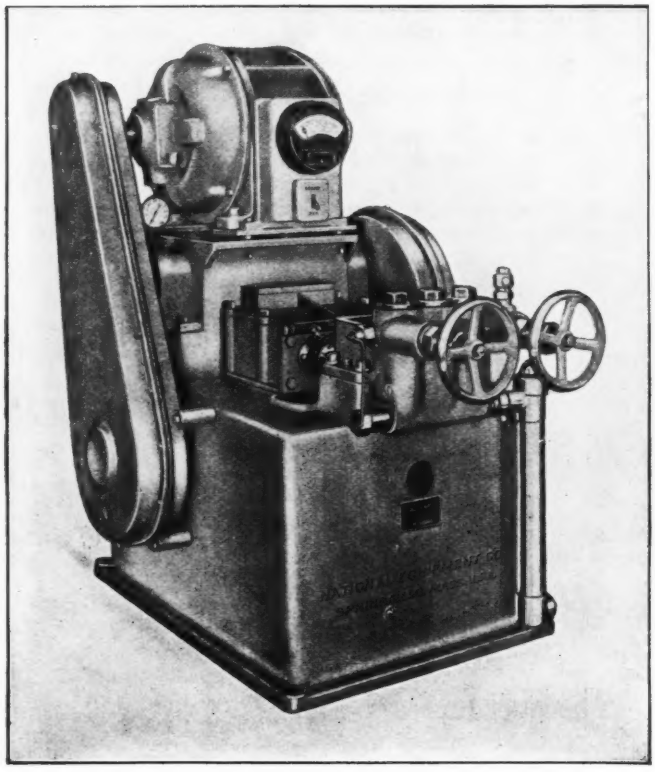


FIG. 12.

FIG. 14.

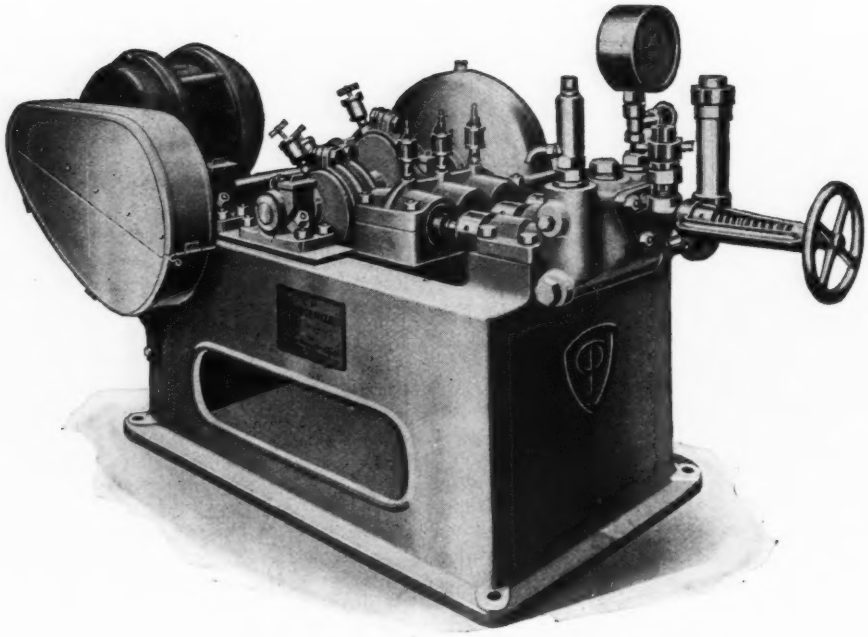


FIG. 13.

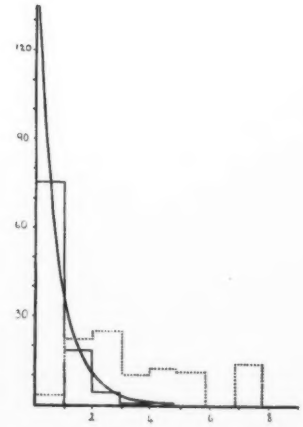


FIG. 10.—Emulsion of Viscous Paraffin made in Viscoliser. Size and Volume Distribution of Drops. Ord. N Per Cent. and V Per Cent. Absc. Diameter of Drops in microns. Full Rectangles N Per Cent. Dotted Rectangles V Per Cent.

Colonies in Emulsions.

No one who has examined emulsions under the microscope can help being struck with the fact that the droplets of oil are hardly ever distributed uniformly over the field of view. They occur as colonies, clumps, or clusters of drops, and less frequently as chains of drops, the chains containing anything from three to seven drops and the colonies many more drops. This phenomenon is present in emulsions made by all forms of mills, and can be seen in very diverse emulsions and even in the asphalt emulsions used for spraying roads.

The presence of colonies is also seen in emulsions which have been passed through a one-stage homogeniser, and it is claimed that the presence of these colonies causes an increase in the viscosity of such an emulsion, and that this is a marked feature in emulsions containing 40 per cent. or more of disperse phase.

In order to disperse or break-up the colonies, many homogenisers are furnished with a second valve arranged in series with the first, and it is claimed that the viscosity of the resulting emulsion can be controlled by adjusting the pressure at which the second valve works. These are generally known as two-stage homogenisers. Another method of breaking up the colonies is achieved by a special design of the valve head. It is obvious that the greater the pressure at which the valve works, the smaller is the opening through which the emulsion is forced, and hence the greater is the velocity at which it emerges from the valve.

It is probable that the fineness of the droplets depends on two factors: One is the shearing which goes on in the valve and which has been discussed above. The second is the force with which the droplets strike the valve head on emerging from the valve opening, and this probably has an atomising effect, further subdividing the drops and breaking up the colonies.

The second factor, of course, depends a great deal on the construction of the valve head, which should be arranged, if possible, so that the emerging stream of emulsion strikes it at right angles—that is, if the maximum effect is to be obtained.

FIG. 16.

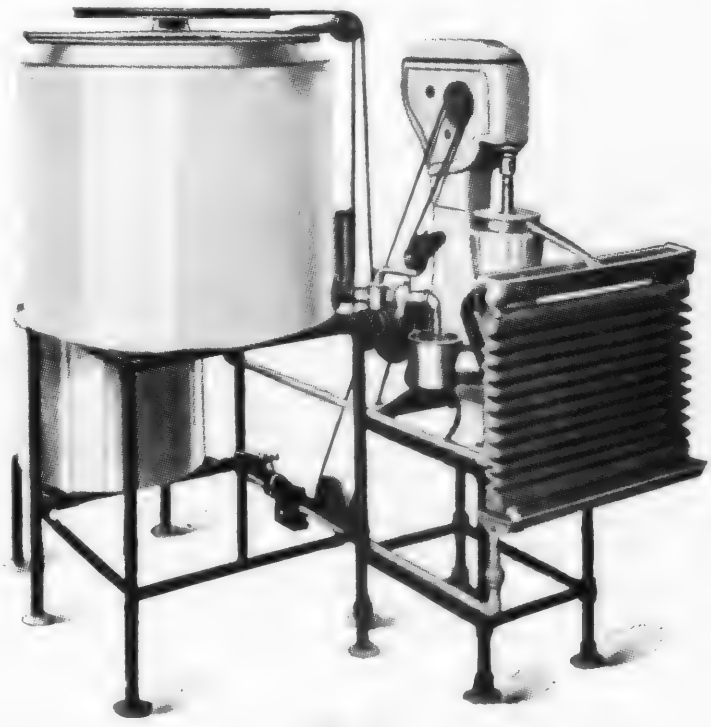


FIG. 17.

New Developments in Plant and Machinery

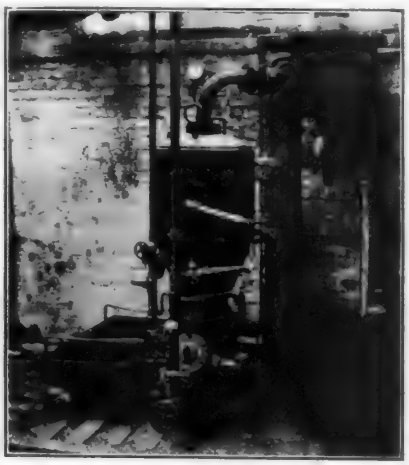
The following notes briefly review interesting developments in various types of plant and machinery used in food manufacture. Information of a similar nature supplied to us with reference to canning, packing, and other equipment has had to be held over for publication in forthcoming special issues. Exhibitors at the British Chemical Plant Exhibition are marked with an asterisk.

*Driers and Evaporators.

The Kestner Evaporator and Engineering Co., Ltd., owing to the small available space, are not able to exhibit such typical plants as they would have wished, but they have a number of large photographs of actual installations of the chemical plant in which they specialise, comprising film evaporators, film driers, spray driers, hot oil circulating system, heat exchangers, etc. They are exhibiting the following plant:

Kestner E.M.S. Drier (Patented).—This new type of drier may be used for problems in which the spray or film drier is hardly applicable, as, for example, the removal of water from semi-dry granular products, filter press cakes, etc. This plant can be heated by means of steam, hot oil circulation, waste flue gases, etc., and can be worked either continuously or on the batch principle, and it is built in sectional form so that the output of any existing plant may be increased by adding further sections.

Kestner Submerged Flame Evaporator (Brunler Patents).—This is a recent development of an evaporator in which direct combustion of the fuel used takes place actually in the liquor that is being concentrated; consequently very high efficiencies can be obtained, as, apart from radiation losses, the whole of the heat of the fuel is usefully employed. The vapour leaving the evaporator may, if required, be used for



driving feed pumps or for other similar purposes. This plant (see accompanying figure) has the great advantage that the heat is not transmitted to the liquor through a metallic surface, and consequently the difficulties of hard scale formation from scaling liquors are practically eliminated.

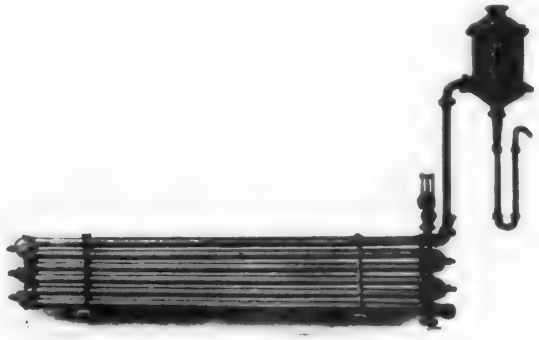
Kestner Silica Gel Air Drier.—This is a new type of plant employing silica gel for air-drying purposes. The plant exhibited will deal with some 1,000 cubic feet of air per minute and remove over 90 per cent. of the water from the air. After drying about a quarter of a million cubic feet, this size unit requires regenerating to drive out the absorbed moisture ready for a fresh drying cycle. The regeneration may be carried out by heating the plant in any convenient manner. Unfortunately, owing to regulations of the exhibition building, it is not possible to demonstrate the regeneration, but the air-drying cycle will be shown working to those who are interested. This type of plant is not only of value in producing air of almost zero water content, but also for the purification and drying of compressed gases such as oxygen, carbon dioxide, etc.

Kestner Vortex Stirrer.—A small working model is shown, from which can be seen the intensive mixing and stirring effects obtained with the Vortex stirrer. This stirrer not only has the advantage of efficient mixing in a short time, but also, if required, is arranged with a special flexible bearing so that no footstep or other bearings inside the liquor are necessary.

Kestner High Speed Stirrer.—This is a new type of stirrer which is seen working in a rubber-lined vessel, and is of great value in cases where it is not required to obtain such an intensive mixing as would be obtained with the Vortex stirrer. One of its great advantages is that it is portable and can be fixed to any existing vessel or tank.

Kestner Pyrolene High Temperature Heating Plant.—This is an entirely new plant developed for obtaining a temperature of about 700° F., which is higher than can be obtained by the patent oil circulating heating plant. This exhibit will be shown operating with automatically controlled temperature regulator.

Kestner Patent Horizontal Evaporator.—This plant is particularly suitable for evaporation of relatively small quantities up to 1,000 lbs. per hour, and has the advantage of



taking up extremely little floor space. It is readily accessible, and is available with various special alloy contacts to suit different liquors that have to be concentrated (see accompanying figure).

Kestner Patent Acid Elevator.—This is used for elevating sulphuric and other acids in cases where compressed air is available and the installation of a Kestner glandless acid pump is not suitable. A large number of these elevators have been successfully working for several years in acid plants throughout the world.

Magnetic Separators.

In many instances in the food and allied industries it is desirable to remove from incoming raw materials all foreign matter which may prove injurious either to the machines through which the raw material is to be passed, to the

finished product itself, or to the consumer. When the foreign matter is likely to consist of iron or other magnetic materials, one of the best methods of separation is offered by the "waterfall" type magnetic separators. These separators, which are made by the Rapid Magneting Machine Co., Ltd., of Birmingham, consist of a magnetic trough having oak sides. The material treated flows over one or more magnetic units placed across the trough. Each unit consists of a high intensity magnetic bar directly magnetised by a coil or coils beneath, the number of coils varying from one upwards, according to the trough width. The edges of the magnetic bars are specially shaped and stepped so that material treated falls over the edge waterfall fashion, and is thoroughly turned over, ensuring efficient separation.

Above the units at the top is an automatic door which, when closed, stops the feed. At the bottom is a collapsible bridge which, on turning, diverts the accumulated iron into a receptacle. On failure of current, or when current is switched off at intervals, these two work together by a coupling, simultaneously stopping the flow and diverting the released iron. The mechanism is replaceable by hand in working position when current is restored, and a cord or chain operation may be adopted.

The Sharples Super Centrifuge.

The use of centrifuges to replace bulky settling and clarifying tanks for the removal of unwanted constituents from industrial liquors and similar purposes is steadily increasing. A centrifuge of the type used for such purposes as these, is manufactured by Messrs. Super-Centrifugal Engineers, Ltd.

Essentially, it consists of a hollow cylindrical vessel, rotating on its axis and containing the liquid to be treated. In the case of a liquid or a mixture of two liquids containing heavy suspended solids, the solids are deposited on the walls of the bowl by the influence of centrifugal force, while the liquids pass continuously through the bowl and are discharged separately.

As an interesting example of the value of the process, the application of this centrifuge to the recovery of cacao butter, etc., from waste confectionery may be quoted. The chocolate coatings of sweets are rich in cacao butter. This fat obtains a high price, and its recovery in a pure state is profitable; but before the use of the Super-Centrifuge it was unrecoverable, and any damaged chocolate was reworked into a low-grade confectionery. Now the stale chocolate confectionery returned from distributors, together with any spoiled in manufacture, is mixed with hot water and centrifuged. The machine delivers a clean, dry fat from one outlet and a concentrated sugar solution from the other, and retains the solid chocolate in the bowl. The fat goes into high-grade products, while the chocolate and sugar solution are also used again.

Weighing Machinery.

In the case of food factories which issue their products in ready packed form, it is necessary to keep a close check on the weight of the package. A very suitable machine for this duty is the Avery A.583, made by Messrs. W. and T. Avery, Ltd., Birmingham.

In the design a head has been incorporated, which may be turned to suit the convenience of the operator without affecting the accuracy of the scale. This is useful where the operator is weighing predetermined loads (such as packeted foodstuffs) fed from a travelling band, allowing the weighings to take place in the minimum of time and with the chart in full view of the operator.

Owing to the sensitiveness of the scale, the chart indications are made extremely clear, and it will be readily understood that this visibility would be valuable to an overseer of a department where large numbers of weighing to a predetermined load were taking place, as it would enable him to observe from a distance whether accurate weighings were being made.

*Aluminium Cooking Pan.

We illustrate three A.P.V. stationary aluminium pans with counterbalanced covers and of 150-gallon capacity. Both inner pan and outer jacket are of aluminium, and the working pressure is 40 lbs. per square inch.

These and other examples of plant are being exhibited by the Aluminium Plant and Vessel Co., Ltd., who invite manufacturers to discuss their problems and requirements on this as on all previous occasions of a similar nature.

*Self-Discharging Centrifugal.

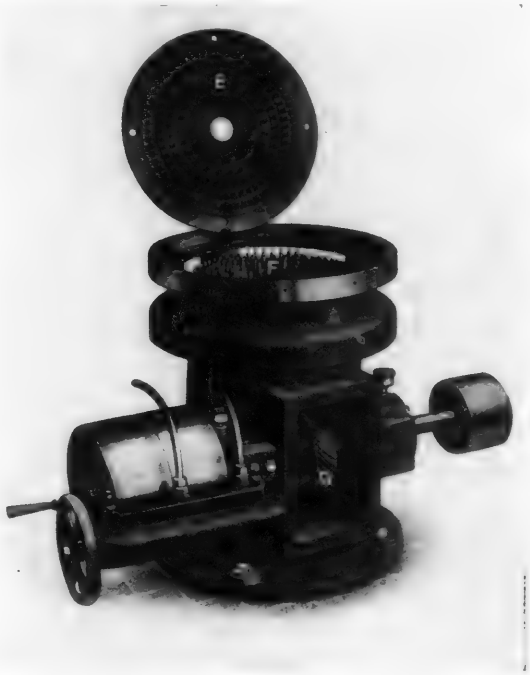
An exhibit of more than ordinary interest is a new type of self-discharging centrifugal made by Thomas Broadbent and Sons, Ltd., of Huddersfield, for dealing with slurry, and is especially suitable where the latter contains about 15 per cent. solids by weight. The slurry is fed at the rate of about 2,000 gallons per hour, and the remarkable efficiency of the machine may be gauged from the fact that the moisture content of the continuously discharged slurry is only 12 to 14 per cent., while the effluent water contains no more than 1 per cent. solids. It will be readily seen that the field of application for this type of centrifugal is almost unlimited.

It is interesting to note that Messrs. Broadbent also make another form of self-discharging centrifugal for de-watering solids, which is being used for dealing with washed coal, but is being developed for many chemical problems. The 30-inch size machine will de-water 30 tons per hour of saturated coal (passing through 1-inch mesh) down to 6 to 10 per cent. water content. During a recent test for wear and tear the centrifugal treated continuously 70,000 tons of coal without any trouble whatever.

It will be remembered that Messrs. Broadbent are makers of centrifugal fat extractors and separators for extracting and separating fat from practically all fat-bearing materials such as bones and meat offals, of digester residues, and bones, meat offal, and fish residues coming from the dry rendering machine. These machines are also used for recovering oil, grease, etc., from nuts, seeds, cotton waste, filter cloths, etc. They are entirely self-contained and are not dependent on mechanical power or belts.

Grinding and Blending Mill.

The accompanying photograph shows the " KEK " patent Grinding and Blending Mill of the Buffoline Noiseless Gear Co., Ltd. One of its special applications is in the production of icing sugar without the use of screens or grids and in the intimate mixing of custard and ice-cream powders. The small mill illustrated may be used for the grinding and blending of dry powders, the blending of pastes, creams, and ointments, or for emulsifying, merely by changing the discs marked E and F.



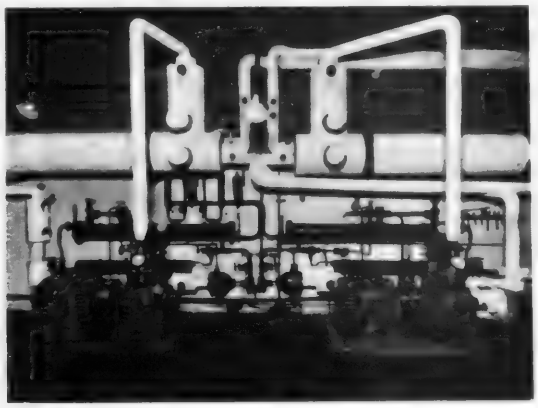
The grinding is done by a large number of steel pins set in concentric circles. The top disc E is stationary, and the bottom disc F is fixed to a vertical spindle mounted in ball thrust and journal bearings. It rotates at 6,000 to 8,000 revolutions per minute, according to the size of the mill. On the lower end of the vertical shaft there is a multiple worm which gears with a phosphor bronze worm wheel keyed to a horizontal shaft carrying the driving pulley or the coupling to the electric motor. The worm wheel driving the worm increases the speed of the vertical shaft six times. The material being ground passes outwards by centrifugal force between the numerous standing and moving pins, which do the work of grinding and blending. It leaves at the periphery, and the movement is assisted by a current of air drawn through the machine.

Glass-Lined Equipment.

The same resistance to corrosion as laboratory glassware plus the added strength of steel is claimed for " Pfaudler " glass-lined equipment, which to-day is used in a wide variety of industries, including the dairy, baking, chemical, cosmetic, beverage, food products, ice-cream, pharmaceutical, textile, and allied trades. " Pfaudler " equipment is used in all of these industries, primarily because of the cleanliness of the glass lining. Put another way, it keeps pure products pure and prevents contamination of delicate products such as essential oils, essences, ice-cream, preserves, liquid sugars, etc. One of the comparatively new equipment developments has been some special process Pfaudler units for the manufacture of insulin. Other equipment recently made has been for the manufacture of liver extract used in treating pernicious anæmia; while numerous units have been supplied for the preparation of cough syrups, drugs, disinfectants, castor oil, cod liver oil, medicinal wines, patent medicines, etc., all of which are taken internally and which, in consequence, have to be of the highest possible degree of purity.

Automatic Control of Refrigeration Plants.

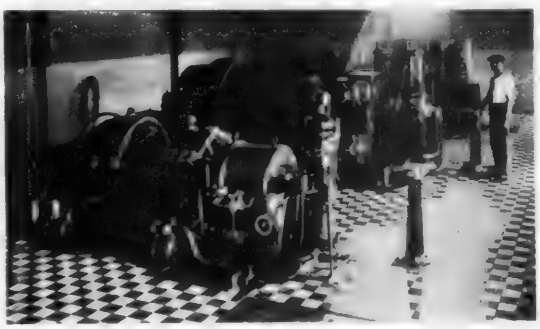
Full automatic control is now being applied to refrigerating plants of much larger size than has been the case previously. It is now possible to apply automatic control to plants of practically any size, the starting and stopping of the compressors, as well as their regulation while running, being



controlled by thermostatic gear. An installation of this nature, as carried out by Messrs. J. and E. Hall, Ltd., the well-known refrigerating engineers of Dartford, is shown herewith. The installation comprises duplicate machines of the ammonia compression type, their duty being the cooling of yeast rooms at Messrs. Truman, Hanbury and Buxton's brewery.

Power from Heating Steam.

Two types of turbine for the generation of cheap power are being produced by Messrs. W. H. Allen and Co., Ltd., of Bedford. These are known as " back pressure " and " pass-out " turbines, and are intended to be used in connection with heating or process steam. It is claimed that, as the turbines work in the first case completely, and in the second case partially, non-condensing, their operation is very economical, and that electrical power can be generated by



them at a cost of $\frac{1}{16}$d. per unit. The method adopted is to raise the steam at a pressure as high as possible above the pressure at which the heating supply is required and to expand the steam in a back pressure or pass-out turbine down to the process steam pressure, the turbine acting as a reducing valve. In a turbine used in this manner there is

practically no loss, as the whole of the energy in the steam is utilised either as mechanical power or as heat in the turbine exhaust steam available for use in the process.

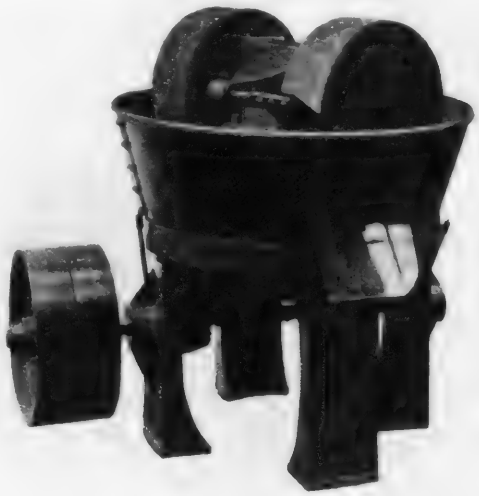
If the heating steam demand is great in proportion to the power required, back pressure turbines should be installed. These are designed to reduce the pressure of the whole steam supply from the initial to the process pressure, and the photograph illustrates a plant of this type.

The installation consists of two back pressure geared turbo-generators (towards back of engine room). Technical particulars relating to these are as follows: Normal full load output, 450 kw.; overload capacity, 25 per cent. for two hours; turbine speed, 6,000 r.p.m.; generator speed, 750 r.p.m.; characteristics of generator, 230/115 v. D.C. three wire; steam pressure, 110 lbs. sq. in. gauge; superheat, 125° F.; exhaust pressure, 60 lbs. sq. in. gauge; steam quantity at overload, 82,000 lbs. hr.

The machine in the foreground is a 150-kw. (25 per cent. overload for two hours) condensing turbo-generator, which is installed to provide any small balance of electrical power which may be required over and above that obtainable from the process steam requirements. The overall efficiency of the condensing set is much lower than that of the back pressure units, but its addition enables the installation to operate independently of any other power supply, and the proportion of power generated condensing is in any case very small. The engine room shown in the photograph is that of a well-known meat extract company.

*Milling and Grinding.

The accompanying illustration shows an entirely new granite-edge runner mill which has been produced by Messrs. J. Harrison Carter, Ltd., of Dunstable. This machine is suitable for grinding a variety of materials to the finest



possible product, and also for mixing two or more substances where a thorough incorporation is required. It takes very little power, state the makers, it is sturdily built, and all bearings are fitted with nipples for lubrication by grease gun, which is supplied with the machine. When required, the machine can be fitted with a stainless steel loose cover.

Pasteuriser or Cooler.

Hitherto plant of this type has suffered the disadvantage of being difficult to keep clean. Messrs. Robert Morton and Co., Ltd., of Burton-on-Trent, manufacturers of food production plant, have now developed coolers (or pasteurisers) for liquid foods, salad creams, mustard mixtures, vinegars, etc., which are so constructed as to admit of being readily cleaned and sterilised. The tubes themselves, being straight, avoid the formation of pockets or cavities, and are made of tinned copper, nickel, Monel metal, stainless steel, or other metal. Another advantage is that it is possible to vary the capacity as desired by adding or removing sections or units.

Nickel and Monel Metal Plant.

Pure nickel and Monel metal (copper-nickel alloy) have numerous advantages as materials for the construction of plant for the food factory. These metals will not contaminate food. They are solid throughout, and cannot, therefore, chip like ordinary enamel ware, nor have they any surface coating to wear off like plated goods. Retinning costs—an important consideration where copper vessels are used—are eliminated.

A large packer of tinned and bottled foodstuffs uses a pure nickel tank for fruit juices and reports complete satisfaction and excellent service. A further report from the same source reveals that Monel metal proved under test to be an excellent material for jam-boiling autoclaves. (Monel-Weir, Ltd.)

Rapid Freezing Plant.

A number of high speed sleeve valve refrigerating compressors have been supplied by Messrs. H. J. West and Co., Ltd., in connection with the "Z" system of rapid freezing for meat, fish, fruits, and other perishable foodstuffs (see

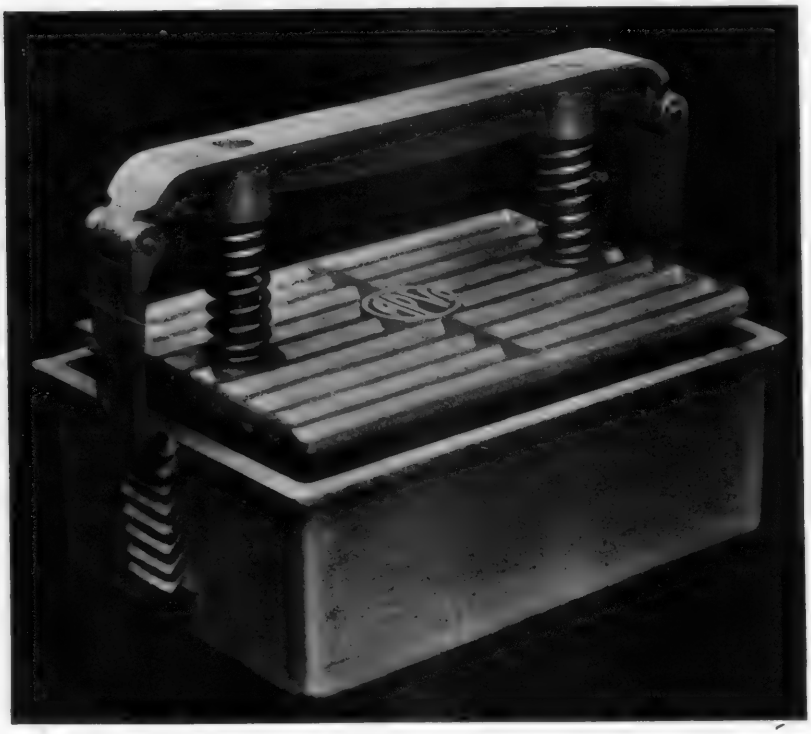
accompanying illustrations). The "Z" process of rapid freezing should not be confused with the process used in the case of (for example) frozen meat as at present known. In ordinary frozen meat the freezing time is two days or even longer, with the result that the ice crystals formed in the

meat are large and damage the tissues to such an extent that drip occurs on thawing, and the quality and food value of the frozen produce is greatly deteriorated.

On the other hand, it is claimed the "Z" method, by completing the freezing process in about as many minutes as the older method takes hours, produces crystals so minute that the tissues are undamaged, and after thawing the food is equal in quality to fresh food.

*Aluminium Brisket Mould.

The Aluminium Plant and Vessel Co., Ltd., make a useful form of brisket mould illustrated here. Deterioration of the meat while exposed for sale is prevented by longitudinal air channels moulded in the underside of the brisket, where it rests upon the cutting slab. The brisket is cooked under continuous pressure by means of compression springs and crossbar, while the channels are moulded by means of a fluted lid. The whole is made in a special aluminium alloy.



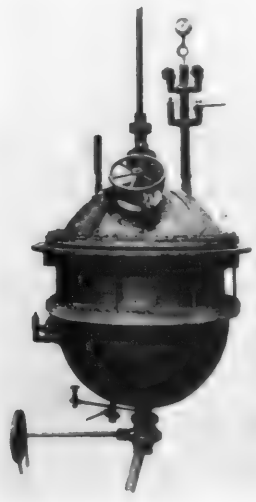
*Mixing and Sifting Machinery.

Messrs. Wm. Gardner's exhibits at the Chemical Plant Exhibition will include the firm's combined patent "Rapid" sifting and mixing machine, which is fitted with an essence sprayer for adding liquids, essences, flavourings, and colourings in liquid form, etc., to materials during the working process. An improved air pump and compressor has been recently added to this machine, whereby the air and liquid is operated by one control; also by means of the special free-wheel clutch arrangement the sprayer can be thrown out of action and the machine becomes an ordinary sifting and mixing machine.

Another exhibit will be a "Quick-Change" powder dresser, which is specially adapted for sifting cocoa powder, starch powder, and similar materials where friction must be avoided. No brushes are used in this machine, but in place of them automatic tappers are fitted outside the barrel by means of which the meshes of the sifting medium are kept open. The machine is also fitted with an automatic feed so that the material can be regulated to the dressing cylinder. A worm conveyor is fitted in the bottom to collect the sifted powder from the opening in the bottom. The feature of this machine is that the barrel can easily be changed, and another coarser or finer mesh be substituted in a few minutes. All parts are accessible so that they can be cleaned without fear of one powder spoiling that which follows.

Autoclave.

The accompanying illustration shows what is probably the first all-nickel autoclave for sugar filtration and pomace juice extraction made in Great Britain. This particular autoclave was part of a plant supplied by Messrs. Brierley, Collier and Hartley, Ltd., and was entirely constructed of pure nickel, even including the pipes and valves. It was designed to deal with one ton of sugar at a time.



The autoclave is fitted with a mixing apparatus, safety valve, thermometer, pressure gauge, air release, etc. It was constructed for a steam pressure of 80 lbs. to the square inch and an internal air pressure of 50 lbs. to the square inch, the latter being used to blow the contents either to receiving drums, sugar filters, weighing tanks, or pulping machines.

This particular autoclave has now been in use approximately eighteen months without the slightest sign of contamination.

*Evaporators and Dryers.

At the British Chemical Plant Exhibition a number of new patented designs are being exhibited by Messrs. G. Scott and Son (London), Ltd., and Messrs. E. Scott and Co., Ltd., which have never hitherto been displayed. Among these are the Scott vacuum evaporator of the patent forced circulation type with external calandria. This design is claimed to embody the features of the ideal milk evaporator of accessibility to every contact part for cleansing and sterilisation, and high velocity through the tubes of the external calandria, as compared with which the conditions in a coil pan may be described as relatively stagnant. It embodies facilities for rapidly cooling the product under vacuum while vigorous circulation is maintained. The design is available in all metals and alloys, and the plant is also particularly adapted to the concentration of liquids from which high density products are required. Densities, it is said,

may be attained little short of solidification which are unobtainable in an evaporator dependent entirely upon natural circulation. The design is also available in multiple effect.

A *Scott Solvent Extraction Plant* will also be shown. The design exhibited is the patent S.B. plant for the use of trichlorethylene. This plant is in line with the patent S.C.K. design. The former has been particularly designed for dealing with wet materials without agitation, while the latter is adapted to the treatment of materials of low moisture content. The plant is of elastic type and applicable to a range of materials too wide to be enumerated.

A small scale unit, a *Scott Vacuum Dryer*, on the most compact lines, will also be included. The location of the condenser with good drainage into the receiver, with facilities for the observation of drying progress, the mountings of the vacuum pump, and the simplicity of the design, are special features of this plant. Many types of Scott drying plant are available of the vacuum and hot air types, for use with any heating media.

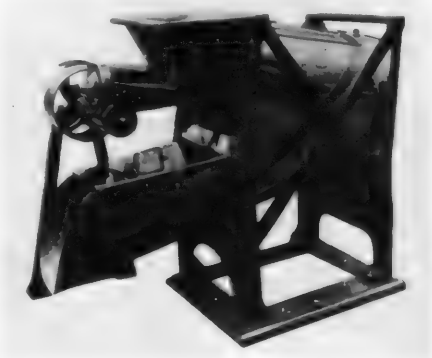
The Booth Attrition Grinder.

The patent steel or attrition grinder and dresser combined, which is one of Messrs. J. Booth and Son's (Ltd.) latest productions, will, it is claimed, reduce in one operation all kinds of grindable materials to whatever degree of fineness is required. Its action is unusual, in that grinding does not take place on the dressing screens, which are well out of the way on the side of the grinding chamber.

Fruit and Paste Sieving Machine.

This type of machine, made by Messrs. William Brierley, Collier and Hartley, Ltd., finds extensive use in the jam and confectionery trades, and has been greatly improved in many respects during the past two or three years. Thus, it is not now necessary to remove the brush shaft when it is desired to adjust the brushes for wear, as these are carried on special brush holders instead of having to remove wood screws holding the brushes in their carriers. In addition, the brushes slide off as one unit on their own carriers and can be reversed and replaced in the machine within half a minute.

Two further improvements have taken place within the past few weeks, both of which are of importance. On the old style of machine the head behind the gear-box was fitted with a stuffing box to prevent oil running down into the pulp and the acid from the pulp getting into the gear-box. The stuffing box is now done away with, and the special arrangement over the shaft prevents any possibility of these



two faults occurring. Also, the hopper is now made horizontal instead of sloping.

These machines are being manufactured in increasing quantities in Monel metal, stainless steel, pure nickel, and aluminium, and quite a number are now being supplied to the sauce trades, as they require practically no attention as regards cleaning, this usually being done with a hose pipe. They have also been supplied to certain trades with all the contact metal enamelled, but the metals referred to above are replacing this method.

With regard to the particular machine illustrated here, it will be seen that it has an extra long pulp delivery chute. It is now possible to obtain these machines with the pulp delivery in five different positions—namely, on either side of the machine, below the machine, at the feed end of the machine (as illustrated), or the very latest type with both the pulp and refuse delivery at one end of the machine. This latter machine will be on view for the first time at the Chocolate and Confectionery Exhibition, Olympia, August 19 to 27.

Electrically Driven Reciprocating Pumps.

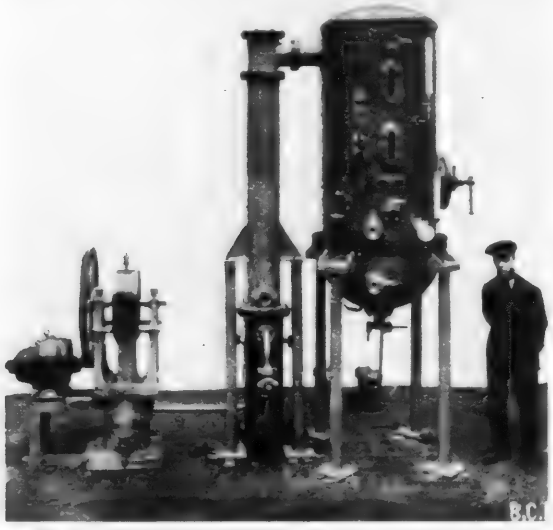
For general pumping duties, for handling water, oils, liquors, etc., a type of pump recently put into standard production is the Weir electric drive two-throw reciprocating pump, shown herewith. As will be seen in the accompanying photo, the motor is carried directly above the pump, thus conserving floor space. The drive is through high-efficiency worm gearing, running in a totally enclosed oil bath. The

pump is double acting, self-priming, and positive in action, and is able to work with a high suction lift. Its efficiency is high, and the type of gearing used makes it practically silent in operation—a feature of considerable importance for some locations. This pump is suitable for operating at pressures up to 80 lbs. per square inch, but can be supplied for higher pressures if desired. It may be said to combine the convenience and other advantages of electric transmission with the simplicity and reliability of the reciprocating pump.

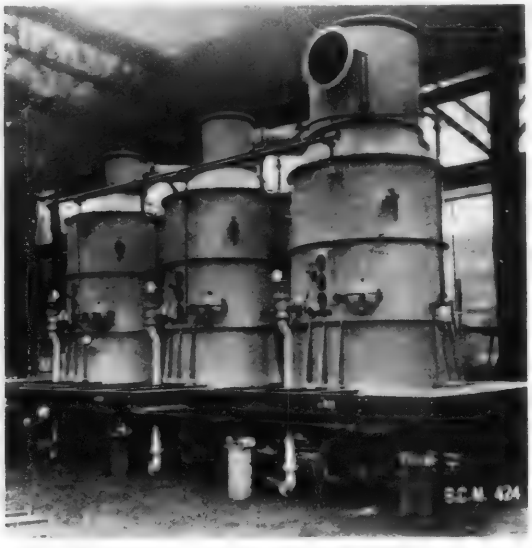
Messrs. G. and J. Weir, Ltd., have also introduced a multi-stage turbo-feed pump suitable for discharging against very high pressures and for large outputs for incorporation with large steam generating plants of high load factor.

Evaporators.

Evaporators of all descriptions form a prominent feature of the plant built by Blairs, Ltd., of Glasgow. Among installations recently produced we note a single effect



evaporator with surface condenser and wet air pump for the production of coffee essence. Two other recent installations are illustrated here. The upper photograph shows a single effect evaporator with surface condenser and wet vacuum



pump for the production of malt extract and cod liver oil. The lower shows a large triple effect evaporator used in connection with the production of meat extracts. This photograph does not show condensing plant or pumps.

Pumps.

Bore-hole pumps are frequently installed in food factories when large volumes of water are required from wells on site. In many cases the pump unit is at a considerable depth below ground (sometimes as much as 400 ft.) and consequently the design of the units has to be such as to give the greatest reliability. The driving motor is mounted at the top of the bore-hole casing, power being transmitted to the pump unit at the bottom by means of a long, vertical shaft passing down the centre of the discharge column, supported at intervals by bearings secured between adjacent flanges of the casing.

The " Drysdale " pump, which is a well-known product of Messrs. Drysdale and Co., Ltd., of Glasgow, possesses the following features: The headpiece is designed to carry the whole weight of pump, pipes, and shafting. No part of this casting is subject to corrosion from water delivered from the bore—a most important feature in waters heavily charged with brine or other mineral salts.

The baseplate casting is permanently secured to the concrete header surrounding the top of the bore-hole. The headpiece, with thrust bearing, rising column, and pump, can be withdrawn without disturbing this seating.

All pump impellers are dynamically balanced on a special machine at the makers' works both singly and collectively on the pump shaft before final erection of the pump.

A thrust bearing is provided in the headpiece at the surface for the purpose of carrying the weight of shafting, etc. This bearing may be of the ball thrust or Michell type, depending on the actual conditions. The intermediate bearings are of a special non-metallic fabric with rubber base, capable of resisting erosion by sand.

Rapid Boiling Jam Pan.

This type of rapid boiling pan for use in jam factories has recently been evolved by Messrs. Brierley, Collier and Hartley, Ltd. The pan illustrated was one of a battery constructed for a working steam pressure of 80 lbs. to the square inch, and it will be noticed there are three horseshoe coils in the interior which are connected to the steam jacket. These coils are fitted with special steam jets to ensure that the steam enters them under pressure and does not merely circulate and cause condensation.

Experiments in a large firm of jam manufacturers have proved that this type of pan will deal with a 1½-cwt. batch of jam in seven minutes as against fifteen minutes when using the ordinary pan. The former figure is conservative. It may be asked why these coils are of horseshoe shape; the reason for this is a very practical one—namely, that it allows a spatula to be used for dissolving the sugar where a sugar filtration plant is not installed.

These pans can also be constructed in stainless steel, Monel metal, or nickel, and large numbers have lately been constructed for various food factories and also for chemical factories.

Another interesting development, which is expected to be exhibited at Olympia in August, is a pan of this type being made with the inner vessel of 99·9 per cent. pure silver. This is an entirely new departure, and all details are now being

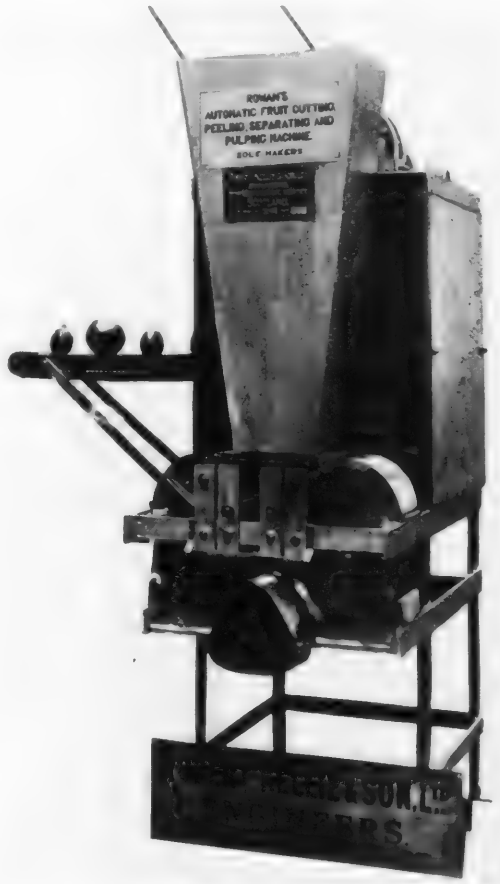
worked out with regard to the effect of certain acids on this metal when under steam pressure or under vacuum. Owing to the present price of silver these pans can be constructed at approximately the same cost as nickel, stainless steel, etc., and should prove extremely useful in certain factories.

It is also to be taken into consideration that the scrap value of silver is approximately half of its original price. This new departure is not a ques ion of depositing silver either electrically or otherwise, but is the pure sheet. Pipes can be lined or beating shafts covered with it.

We hope to publish further details of the finished article at a later date.

Fruit Peeling Machine.

The "Rowan" automatic fruit-peeling machine which has recently been produced by Messrs. Robert Kellie and Sons, Ltd., of Dundee, is obtainable in two types—a direct coupled electric motor-driven machine and a belt-driven model. Either model will automatically quarter, peel, separate the peel from the fruit, and cut the fruit into a pulp. It will handle without grading oranges, lemons, tangerines, and grape-fruits, and can also be advantageously



used for cutting apples, pears, tomatoes, etc. In a modified form the machine will automatically cut and peel fruit into halves for the drained and candied peel trade.

With one girl operating, this machine is capable of dealing with two and a half tons of ungraded fruit per day of eight and a half hours, but if necessary this output can be greatly exceeded, as it is dependent solely upon the ability of the operator to keep the machine charged.

Rubber-Lined Plant and Equipment.

Some of the acids encountered during food manufacturing processes give rise to difficult corrosion troubles. As a general protective coating for plant and equipment under such circumstances, rubber will often be found very satisfactory, and Messrs. Nordac, Ltd., of Harrow, have developed a method of lining plant and vessels with sheet rubber free from any ingredients likely to contaminate or discolour the contained liquid. The rubber is now being applied by means of the spray process, not only to line tanks, but to protect ironwork from the corrosion of acetic and food acid fumes.

The Nordac patent all-rubber screwed hose has also been specially developed to replace rubber-lined iron pipes. It has the obvious advantage of being acid-resisting outside as well as inside, and does not require the use of any metal fastenings, as the joints are made by screwed rubber sockets exactly like ordinary iron-socketed piping.

For use with the Nordac screwed hose or with rubber-lined iron piping the same firm has developed the Nordac rubber-lined acid valve, and the Nordac all-rubber valve. A valve of this type is often necessary for use with food acids, as ordinary metal valves will not stand up long to the corrosive conditions.

Harvey Chemical Plant.

Messrs. G. A. Harvey have recently made some large extensions to their works, more especially in the industrial plant departments.

They are manufacturing drying plants, mixers, steam-jacketed pans, digesters, autoclaves, and similar equipment in all sizes. They are also constructing vacuum drying plants in a full range of sizes suitable for dealing with vegetable products, meat extracts, milk products, milk chocolate, cocoa beans, starches, and patent foods.

Vacuum evaporating plants of an improved type have been developed which are specially suitable for use in the food manufacturing industries.

Messrs. Harvey's new processing retorts are of special interest to firms engaged in the canning and food preserving industries. These are made entirely in steel and without cast parts of any kind. They are provided with special lever type bolts for rapid closing of the cover, an arrangement which has proved most successful in practice.

The Miracle Mill.

The method by which grinding is carried out in the "Miracle Mill" (Mayhew Ramsey and Co., Ltd.) differs from that usually employed in other types of mill in that the grinding elements are composed of a battery of loose swinging hammers. These are held in position by bolts on discs, which are assembled on the mill shaft. When the mill is in operation the material is shattered in mid-aid, and not by grinding between two surfaces of pressure. By reason of the swing hammer principle, grinding friction is eliminated. Moreover, as the hammers are reversible on four points, their life is doubled.

*"Birmabright."

"Birmabright" is the name of an aluminium alloy recently introduced by the British Aluminium Casting (1903) Co., Ltd., of Birmingham. The resistance of this metal to corrosive action under the severest conditions is said to be exceptional. Its fatigue resistance is high, and, with the special quality of high resistance to corrosion, its permanence in all applications is assured. The alloy can be produced in the form of sand, die and pressure die-castings; rolled sheet; extruded angles, rods, and sections; extruded and drawn tubing; bolts and nuts; drawn wire; rivets; wood

and metal thread screws; forgings and hot stampings, etc. In the food industries the composition of Birmabright alloy makes it a very desirable material for the construction of plant. Its freedom from attack by the salts and fatty acids

encountered in cooking makes it suitable for jam making, fruit juice making, milk sterilising, etc., and all forms of boiling, steaming, and frying. The alloy has been tested under conditions more than usually severe, and is recommended for butchers' fittings, especially where sulphur dioxide is used as a meat preservative.

Book Review

The Demand for Canned Fruits. Empire Marketing Board Publication No. 37. March, 1931. Pp. 41. Price 1s. net. H.M. Stationery Office.

A report of an investigation by the Economic Section of the Empire Marketing Board into the retail marketing of canned fruits in the U.K. The object of the enquiry was to examine the position of Empire canned fruits in the retail shops of the main centres of population in the U.K., and to estimate the extent and nature of the competition from fruits of foreign origin. We have already quoted in the Editorial Comments home production figures from this report. The table on page 37, giving the percentage of shops stocking various fruits classified according to country of origin, is illuminating; indeed, the whole report is most instructive, and will undoubtedly prove of great service to canners. This table is reproduced below:

PERCENTAGE OF SHOPS STOCKING VARIOUS FRUITS, CLASSIFIED ACCORDING TO COUNTRY OF ORIGIN.

Fruit.	United Kingdom.	Canada.	Australia.	South Africa.	Malaya.	United States.	Other Countries.	Total.
Peaches	—	—	26	—	—	98	—	100
Pears	—	13	17	1	—	98	—	100
Pines	—	—	—	12	90	56	—	99
Apricots ...	—	—	14	—	—	91	—	93
Fruit Salad ...	11	—	—	—	—	76	—	82
Loganberries...	—	—	—	—	—	33	—	34
Plums	26	2	—	—	—	2	—	29
Strawberries ...	26	—	—	—	—	2	2	29
Raspberries ...	19	—	1	—	—	1	1	21
Damsons ...	10	—	—	—	—	—	—	10
Cherries ...	—	—	—	—	—	—	8	9
Grape-fruit ...	—	—	—	—	—	5	—	5
Black Currants	1	—	3	—	—	—	—	5
Greengages ...	3	1	—	—	—	—	—	4
Gooseberries ...	2	—	1	—	—	—	—	3
Apples... ...	—	—	—	—	—	1	—	1

Camouflage

THE history of publishing furnishes examples of unsuccessful attempts on the part of business houses to foist on the trade what really amounts to a glorified "house organ" in the guise of a respectable technical journal. The necessity for caution is obvious. One of the basic requirements in reputable trade journalism is that it shall be entirely dissociated from any business activities within the industry which it is serving. Its independence in this respect should be definitely above suspicion. A trade journal cannot serve two masters; it cannot sell goods to the trade under the cloak of disinterested journalism—at least it can, but it is obviously not in the interests of advertisers that it should be allowed to do so, unless, of course, they are prepared to pay the price.

In the particular instance under notice, we observe on both the title page of the projected journal and also on the circular letter distributed with a view to soliciting advertisements an apparently dignified list of "Contributing Editors." We have puzzled over the significance of this intriguing designation. What exactly does it mean? What implications does it carry? Above all, are they legitimate implications, and can they be honestly substantiated? To our mind the term "Contributing Editors" signifies that the gentlemen named have formally accepted appointment as paid members of the editorial staff. No doubt that is how it is viewed by most members of the trade approached for advertisements and subscriptions. If, on the other hand, "Contributing Editors," merely means that they may at some time contribute articles and so forth, then it seems to us, and no doubt to everyone else, that false representations are being made and that the "Contributing Editors" are being ignominiously exploited as a cat's paw.

The Manufacture of Crustless Cheese

THE FOLLOWING notes briefly describe the process and indicate the type of plant used in the manufacture of crustless cheese. Some important observations by Templeton and Sommer on the application of scientific control to this industry are also included.

All kinds of cheese may be used for the purpose, but care must be taken to see that it is thoroughly clean and that all traces of mould are removed.

Process and Plant.

The first step is to run the cheese through grinding or refining machines (see Fig. 1), where it is reduced to a fine pulp of uniform consistency. This treatment also shortens the time required for melting the cheese in the kneaders and kettles, and, in addition, the cheese can be trimmed much closer to the rind than when a refiner is not used, thus avoiding a frequent source of waste.

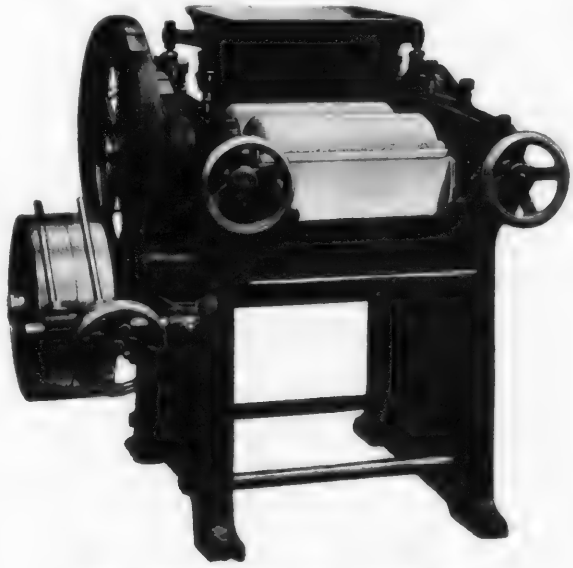


FIG. 1.—Refiner, with Three Granite Rolls.

The pulp is then transferred, with or without emulsifying agents, to a kneading and mixing machine (see Fig. 2), consisting of a steam-jacketed container having a close-fitting lid. Within this chamber are stirrers which rotate in different directions and thoroughly mix the cheese paste, the work being facilitated by admission of steam into the cheese from time to time during the kneading through the valve seen on top of the lid. A mixer of this type will have a capacity of anything up to 266 lbs. of paste per batch. The liquid mass is filled into lined moulds of various shapes and sizes.

Fig. 3 illustrates a filling machine for block cheese. The filling of different sizes requires, of course, different machines, but with special pistons one machine can make various articles, provided the total weight of these falls within the limits of the weights indicated for the particular machine. Both hopper and filling cylinder are jacketed to provide for steam or hot water circulation. The pistons may be of special bronze, nickel alloys, monel metal, or stainless steel.

It is essential that the liquid cheese, while still hot, should be wrapped in a practically sterile medium that will remain closely adherent to the surface of the product. Ordinary cheese wrapping, such as greaseproof or waxed paper, is not suitable, as it will pucker with the formation of air-pockets in which moulds can grow. The best kind of wrapping is tinfoil, specially coated to prevent the cheese from making direct contact with the foil.

For relatively small outputs it is sufficient to use a semi-automatic plant consisting of (1) a mould-

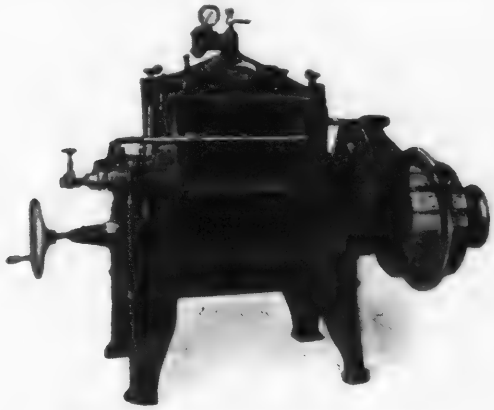


FIG. 2.—Mixing and Kneading Machine.

making machine, (2) a filling machine, (3) a semi-automatic wrapping machine, and (4) a foot press.

In factories where a large production of a single article is aimed at the automatic machine (see Fig. 4)

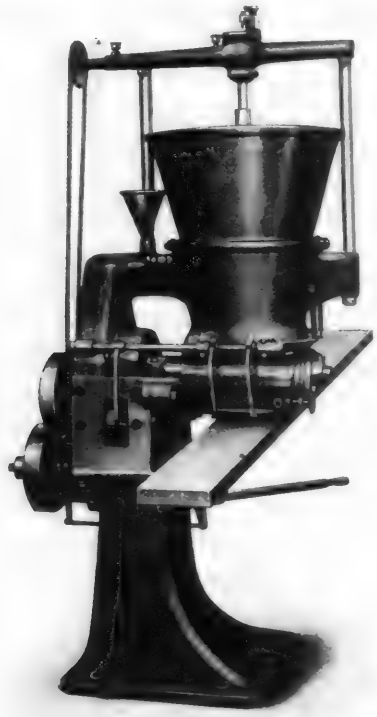


FIG. 3.—Filling Machine for Blocks.

is the most suitable. The output of these machines varies from 50 to 90 portions per minute. They make the moulds, fill, wrap, and close them air-tight; then press and label the portions. Only one girl is required to look after the machine, and at the same time she is able to fill the cardboard boxes with the portions. Various systems of wrapping are employed; two of these necessitate a double wrapping of foil, while a third involves the use of a single wrapping only. The essential point is to have a perfectly air-tight package.

For labelling the boxes or cartons a special machine is available. The output is 35 to 50 boxes per minute, depending on the size of the labels, and the services of only one attendant are required.

Another useful automatic machine may be employed for stitching the paper bands round the cartons, and, by means of an auxiliary device, a piece of string can be introduced between the lid and the carton for tearing the band when opening the box. The output of this machine amounts to 35 to 40 cartons per minute.

Scientific Control.

To the May, 1930, issue of the *Journal of Dairy Science*, Baltimore, U.S.A., H. L. Templeton and H. H. Sommer contributed an interesting study on processed cheese. From the results obtained in this experimental work the following conclusions may be drawn:

1. The use of so-called emulsifiers is beneficial, and the results obtained with sodium citrate indicate that it is superior to di-sodium phosphate. The use of more than 3 per cent. of these salts should be avoided, not only to remain within the legal limits, but also for the effect on the finished product.

2. Temperature regulation is essential in order to ensure the proper pasteurisation of the cheese and also to prevent the colour from changing to "salmon pink." If the cheese is not to be held in the kettle for any length of time, it should be at the lower pasteurisation temperature, and water should be added to make up for the losses due to evaporation.

3. Close observance of the standards set for the moisture content of processed cheese are essential not only for economic reasons but also to ensure having cheese of as uniform body as possible.

4. Good results were obtained with a range in *p*H values extending from 5·8 to 6·2. This would indicate that this factor can be adequately controlled by exercising discrimination in blending.

5. Very young cheese showed excessive fat separation in processing and a rubbery texture in the finished product. Very old cheese also processed unsatisfactorily, yielding a product with a weak body and grainy texture. Good results were obtained when the blending was such that the average age of the cheese was from four to seven months.

6. A comparison of the reaction in terms of *p*H

(*Continued on* p. 206.)

FIG 4.—Automatic Machine.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers.

281. *We have seen a sample of the "Netur" cap for glass containers, and are trying to locate source of supply.* (British Guiana.)

These are made by Messrs. Sutax, Ltd., 10/12, Charterhouse Street, London, E.C. 1.

282. *Recipes for sauces requested.* (Paisley.)

Several were supplied.

283. *We were much interested in the article published in your last month's issue of* FOOD MANUFACTURE *under the heading "Canadian Fish Research." Would you be so kind as to advise us where we can obtain detailed particulars of the investigations carried out at the Halifax Station? We should also be greatly obliged if you would kindly notify us where we can obtain a copy of the report prepared by the U.S. Commissioner of Fisheries, on the Scotch method of smoking haddocks.* (London.)

The required information was submitted.

284. *Will you kindly recommend a list of books suitable for a reference library in the laboratory of a food factory?* (London.)

Such a list was submitted.

285. *Can you furnish us with names of firms likely to require supplies of Chicle Gum?* (London.)

Suggestions were made. Interested parties are requested to get in touch with us.

286. *I understand that the food regulations in force in England allow the use of only two preservatives—sulphur dioxide and benzoic acid—for the preparation of strawberries in casks. I shall be much obliged if you could tell me what are the percentages permitted in each case.* (France.)

According to The Public Health (Preservatives, etc., in Food) Regulations, 1925, it is stated that the amount of sulphur dioxide permitted in strawberry pulp may not exceed 2,000 parts by weight per million. As regards benzoic acid, this is only allowed in coffee extract, pickles and sauces made from fruit and vegetables, unfermented grape juice and non-alcoholic wines, cordials and fruit juices, and sweetened mineral waters.

287. *I want suggestions for a powder to be used as a substitute for white of egg for royal icing especially, and also for meringues. I do not want this icing powder to be too concentrated, and should be glad of the best material to do all the essential icing.* (Gloucester.)

Suggested the enquirer get in touch with W. Aylward Crump and Co., of London.

288. *An article has recently been marketed which is claimed to replace the usual type of fondant icing sugar, which is now so generally used by the flour confectionery trade for covering and decorating fancy cakes, etc. The following are some of the advantages claimed for this article:* (1) *It will remain soft-eating for a long period;* (2) *it will cut without sticking to the knife;* (3) *quantity for quantity, it will go from two to three times as far as fondant. It is advertised for sale at a much higher price than fondant. Have you any information?* (Liverpool.)

The new product to which you refer is a mixture of fondant and royal icing. The proportion varies, but usually it is about 50:50. It would be a matter for you to work this out, as each manufacturer has his own idea on these matters.

An ordinary mixing machine would be suitable for the purpose. We understand that there are also mixtures of royal icing and marshmallow which are very satisfactory, and in which the proportions are (possibly) 75 per cent. icing and 25 per cent. marshmallow.

289. *Enquiry for recipes for making thick and thin brown sauces.* (Cleveland, Ohio.)

One or two were supplied.

290. *Can you assist us with some information on the preserving of Angelica?* (Ipswich.)

Perhaps the following (from O. P. Malcolm's *Successful Canning and Preserving*) will be of assistance:

When the fresh fruit is bruised it has a pungent odour. For candying, the hollow stalks should be gathered in early spring, when they are still tender and the colour is at its brightest. After cutting off the leaves and removing the root ends, place the stalks flat in a deep pan and pour over them a boiling salt solution (1 tablespoonful of salt to 2 quarts of water); soak for ten to fifteen minutes, drain, and rinse well in a cold water-bath. Drain and drop into clear boiling water and allow to boil from five to six minutes. The length of time for boiling will depend upon the maturity of the stalks. When tender, drain and scrape off the outer skin from the stalks. Make a syrup of 1 lb. of sugar and 1 pint of water and boil it until a test with a Balling saccharometer will give a reading of 35°. Cool the syrup and pour it over the Angelica. Put a plate over the stalks to keep them weighted down below the surface of the syrup, and allow to soak for twenty-four hours.

Increase the density after each twenty-four hours' soaking and plumping period as follows, and then soak for three days in the last heavy syrup before removing the stalks from the syrup to dry off:

	Balling.	*Baumé.*
First day plumping period 24 hours in syrup testing	35°	20°
Second day plumping period 24 hours in syrup testing	45°	26°
Third day plumping period 24 hours in syrup testing	47°	28°
Fourth day plumping period 24 hours in syrup testing	52°	31°
Fifth day plumping period 24 hours in syrup testing	57°	33°
Sixth day plumping period 3 days in syrup testing	65°	35°
Seventh day plumping period 3 days in syrup testing	65°	35°
Eighth day plumping period 3 days in syrup testing	65°	35°

At the end of this last plumping period remove the stalks, place them on a wire tray, and dry them in the hot sun or in a cool oven (80° to 100° F.). When dry, cool and dip into a heavy syrup which tests 70° Balling or 40° Baumé, and again dry in an oven, evaporator, or in the hot sun.

The delicate green colour of the crystallised Angelica is apt to fade unless it is kept away from the light. If it is placed in bottles or glass jars, they should be wrapped in heavy brown paper sacks and be stored in a cool, dark, dry place.

291. *Will you kindly recommend makers of a belt conveyor suitable for conveying plates?* (Bradford.)

A list of likely firms submitted.

292. *We should be much obliged if you could put us in touch with a firm manufacturing a machine suitable for cleaning dried fruit, such as currants, sultanas, etc.* (Reading.)

The names of several firms supplying machines of this kind were submitted.

293. *We do not know whether a machine exists for automatic weighing of dried fruit; if so, we should be glad to have name and address of maker.* (Reading.)

Suggested that the enquirer get in touch with W. and T. Avery, Ltd.

294. *Can you tell us where we can obtain machinery for making waxed cartons?* (Gloucester.)

We suggested the Thrissell Engineering Co., Ltd., Chambon, Ltd., and Rose Bros. (Gainsborough), Ltd.

295. *Can you give us recipe and method for making Christmas puddings?* (Cape Town.)

There are many recipes used for the production of Christmas puddings, depending on quality and price.

Here are two recipes and formulæ for puddings of different qualities. The first is the better and is sold in this country at the top price, owing to its undoubted quality.

No. 1 Pudding.	*No. 2 Pudding.*
10 lbs. suet.	9 lbs. suet.
4 lbs. flour.	6 lbs. flour.
6 lbs. breadcrumbs.	3 ozs. baking powder.
6 lbs. Demerara sugar.	9 lbs. breadcrumbs.
10 lbs. currants.	10 lbs. Demerara sugar.
6 lbs. sultanas.	12 lbs. currants.
12 lbs. raisins.	10 lbs. sultanas.
2 lbs. orange peel.	10 lbs. raisins.
1½ lbs. split almonds.	2 lbs. mixed peel.
3 ozs. mixed spice.	6 ozs. mixed spice.
2 ozs. salt.	3 ozs. ground nutmeg.
5 pints eggs.	3 ozs. salt.
1 lb. golden syrup.	4½ pints eggs.
Rind and juice 16 lemons.	1 lb. chopped apples.
Rind and juice 16 oranges.	1½ pints milk.
2 quarts old ale.	2 quarts old ale.

The suet should be finely minced and be free from skin. The fruit should be of good quality and well cleaned. If more currants are added, use less sultanas in proportion. The peel should be cut fine. The breadcrumbs should be taken from the whole loaves, and after slicing and drying in an oven should be passed through a crumbing machine. The spices should be sifted through with the baking powder and flour.

All the ingredients should be thoroughly mixed in the dry state, and then the liquid ingredients are added. Thorough mixing is essential, so that all the ingredients will be evenly distributed.

The tins should be well greased with lard or compound fat and then not quite filled with pudding, so that when a round of greased paper is placed on each, or calico cloth is tied on taut, there is room for the pudding to expand slightly. The puddings should be steamed or boiled in a double boiler for at least two and a half hours for 1-lb. puddings.

When cooked, the puddings should be removed from steamer or boiler and the cloths untied and allowed to cool.

When cold, the tins are washed, new cloths are tied on, and they are ready for sale.

No. 1 mixing should make about seventy puddings, and No. 2 mixing about eighty puddings. The first mixing will cost nearly 1s. per pudding, including the cost of the tins or basins, and should be sold retail at 2s. 6d. The second mixing will cost nearly 10d. each pudding, including the tins, and could be sold at 2s. each, retail.

Cheaper puddings are made, using compound fat or lard in place of suet, and less eggs and more milk to replace them.

296. *Will you please send me a list of books on the manufacture of pickles, sauces, and chutneys?* (Maidstone.)

So far as we know, there are only two books, both American, that are of any use to the manufacturer. The one is by Cruess and the other by Campbell.

297. *In the February issue of* FOOD MANUFACTURE *we read an article entitled "Closures for Glass Containers," in which you mention "Goldy Seals." Would you kindly get in touch with the manufacturers of these seals and the capping machines and ask them to forward us full particulars and prices?* (Sydney, N.S.W.)

This request was passed on to the Aluminium (H.), Ltd., of London.

298. *Kindly supply us with information on the manufacture of rusks.* (London.)

See answer to Enquiry 265, page 175 of the June issue.

299. *Required name of firm able to supply machinery for crushing almonds.* (London.)

Try C. Harrison Carter, Ltd.

300. *Can you supply name of firm making the "Ideal Mill"?* (Birmingham.)

William Brierley, Collier and Hartley, Ltd., supply the "Ideal-Triumph Sugar Grinding Mill."

301. *We shall be glad if you will send us a formula for a thick fruit sauce.* (Hambleton.)

302. *Enquirer supplied sample bottle of Japanese shoyu or soy sauce, which is widely used among the Japanese and Chinese, and wishes to get in touch with any sauce manufacturers or bottlers who might be interested in importing soy, either in bottles similar to the sample or in bulk packages.* (London.)

303. *Please give us the name of a gloy or gum to be used for sticking on labels without rusting the tins.* (Minsterley.)

Recommended enquirer to get in touch with Messrs. Dewey and Almy, Ltd.

304. *Kindly furnish me with the names of the manufacturers of dextrose, either in this country, America, or on the Continent.* (London.)

Names were supplied.

Manufacture of Crustless Cheese (*continued from* p. 204).

and the titratable acidity furnishes a means of gaining some ideas as to the kind of cheese that was processed and the treatment it received.

7. Cheese that can be cut in slices 0·02 inch thick and requires 860 to 1,200 grams with a mechanical advantage of 5 to crush an inch cube to one-half of its original thickness may be considered as having a very desirable body.

8. The keeping quality of processed cheese is dependent upon the heat treatment, the reaction, and to some extent upon the temperature of the storeroom.

9. Discoloration of the tinfoil may be due to the use of phosphate as the emulsifier or to the use of akali giving a reaction above *p*H 6·3.

10. Frozen cheese can be processed satisfactorily.

11. Processing increases the water soluble form of nitrogen in the cheese.

We are indebted to Kustner Brothers and Co., Ltd., for the illustrations given in this article.

Financial News

The Editor cannot accept responsibility for any errors which may appear in the Financial News Section

BANK RATE (1930–1931)

1930. February 6	... ...	4½ per cent.
,, March 6	... ...	4 ,,
,, March 20	... ...	3½ ,,
,, May 1 ...	... ...	3 ,,
1931. May 14 ...	... ...	2½ ,,

Owing to a decline of profits from £198,807 to £115,042, the rate of ordinary dividend payable by **Associated Biscuit Manufacturers, Ltd.**, in respect of the financial year ended March 31 last has been reduced from 11 per cent. to 6 per cent. Registered in 1921, this company owns the entire share capital of **Peak, Frean and Co., Ltd.**, and **Huntley and Palmers, Ltd.**, its own authorised share capital being £2,500,000, of which £2,000,140 has been issued and paid up in the form of £600,000 6½ per cent. cumulative preference shares and £1,400,140 in ordinary shares, all of £1 denomination. The final appropriation account covering the 1930-1931 period is made up as follows :

	£	£
Brought forward from 1929-1930 ...	3,843	
Profit—year ended March 31, 1931 ...	115,042	
Disposable Balance ...		£118,885
6½% dividend on £600,000 Cumulative £1 Preference Shares	30,225	
6% dividend on £1,400,140 Ordinary £1 Shares	84,009	
Carried forward to 1931-1932	4,651	
		£118,885

On March 31 the balances owing to sundry creditors and trade suppliers, and accrued preference dividend, aggregated £19,748 as compared with £20,842 the previous year, while current assets amounted to £25,788 as compared with £25,422.

The audited profit and loss account of **Holbrooks, Ltd.**, covering the twelve months ended March 31 last discloses a net profit of £52,579, this being a decline of £16,224 in relation to the previous year's net profit, and necessitating a reduction in the rate of ordinary dividend from 20 per cent. to 15 per cent. The company's entire authorised share capital of £370,000 has been issued and paid up, comprising £70,000 5 per cent. cumulative preference shares of £5 each and £300,000 ordinary shares of 5s. each. The final figures are summarised below :

	£	£
Brought forward from 1929-1930	20,581	
Net Profit—year ended March 31, 1931	52,579	
Disposable Balance ...		£73,160
5% dividend on £70,000 Cumulative Preference £5 Shares	2,880	
15% dividend on £300,000 Ordinary 5s. Shares	45,000	
Carried forward to 1931-1932	25,280	
		£73,160

The following are the principal balance sheet items :

	March 31, 1931. £
Investments	169,254
Debtors	10,739
Stock	39,045
Cash	50,644
Creditors, including Contingencies	44,865
Properties and Plant	148,963
Goodwill and Trade-Marks	35,145
Shares in Subsidiary	103,000
4½% Debenture Stock	75,745

At the recent price of 82 the debenture stock yields 5·18 per cent., and recently the preference shares were quoted at 87s. 6d., and the ordinary shares at 12s. 6d.

The margin of gross profit realised by **Forster's Glass Co., Ltd.**, during 1930-1931 was only £23,073 as compared with £53,541 for the previous twelve months, and, after debiting debenture and other interest and charging directors' fees, the net profit amounted to £11,140, or a decrease of £30,150. By drawing on the carry forward and making no allocation to reserve, the ordinary dividend has been maintained at 5 per cent. for the third successive year, the final account being made up as follows :

	£	£
Brought forward from 1929-1930	14,272	
Net Profit—year ended March 31, 1931	11,140	
Disposable Balance ...		£25,412
7½% dividend on £175,000 Cumulative Preference £1 Shares	13,125	
5% dividend on £87,500 Ordinary 10s. Shares...	4,375	
Carried forward to 1931-1932	7,912	
		£25,412

The balance sheet shows the following assets and liabilities :

	March 31, 1931. £
Land, Buildings, Plant, etc.	277,028
Goodwill	35,000
Stock, Loose Plant, etc.	128,257
Debtors	50,339
Cash	215
Creditors	39,771
7½% Debenture Stock	80,000
Held by Bankers as Security for Loan	80,000
Second Mortgage Debenture	21,000
Reserve Fund	30,000

The preference shares were recently quoted at 11s., and the ordinary shares at 5s.

The first accounts of the **British Can Co., Ltd.**, covering the year ended December last have now been submitted, disclosing a profit of £21,125, from which must be deducted depreciation amounting to £11,516, leaving a net profit of £9,609, which is the disposable balance. The authorised share capital of this company is £750,000, and £536,000 has been issued and paid up in the form of £186,000 7½ per cent. redeemable cumulative preference shares and £350,000 ordinary shares, all of £1 each. After providing for the preference dividend, amounting to £13,587, there is a debit balance of £3,978 to be carried forward to the next account. The following are some of the chief balance sheet items :

	Dec, 1930. £
Goodwill	21,508
Preliminary Expenses	48,020
Cost of Agreements with the American Can Co. and Thermokept Corporation	82,500
Stocks	111,389
Debtors...	47,974
Cash	367
Creditors	64,052

The preference shares stand at about 17s. 6d.

The directors of **Goldsbrough, Mort and Co., Ltd.**, have decided that no further transfers of shares or debenture stocks from the Australian registers will be permitted to take place until further notice. This does not, however, prevent the transfer of

shares or debenture stocks from London to the Australian registers.

Mr. G. McTier Sheppard has been elected a director of **Rio de Janeiro Flour Mills and Granaries, Ltd.**

Upon the retirement of Mr. G. H. Cox from the board of **Salt Union, Ltd.**, Mr. F. W. Clark, the former deputy-chairman, has been appointed chairman of the company, with Mr. H. J. Falk as deputy-chairman.

Mr. John Davidson, chairman of the British Empire Trust Co., has joined the board of **Vine Products, Ltd.**

During the sixteen months to April 30, 1931, the **Amalgamated Metal Corporation, Ltd.**, realised a net profit of £298,318. The company was formed at the end of 1929, and the issued capital amounts to £5,335,792, made up of £900,000 in 6 per cent. cumulative preference shares and £4,435,792 in ordinary shares, all of £1 each. A dividend of 5 per cent. is being paid on the ordinary shares, and £18,751 is written off the balance of the preliminary expenses account, the final account showing the following figures:

	£
Net Profit—sixteen months ended April 30, 1931	298,318
Disposable Balance	£298,318
	£
6% Preference dividend	53,917
5% Ordinary dividend	214,290
Preliminary Expenses written off	18,751
Carried forward to 1931-1932	11,360
	£298,318

The preference shares were recently quoted at 19s. 3d., and the ordinary at 14s. 3d.

The order confirming the reduction of the capital of **Pugsley and Wakeling, Ltd.**, the Cardiff millers, from £100,000 to £64,646 has been registered by the Registrar of Companies.

Sir James A. Cooper, K.B.E., has resigned from the board of **United Molasses Co., Ltd.**, and its subsidiaries, and Mr. R. G. Simpson has been elected to the vacancy.

Colonel S. H. Pollen has resigned the chairmanship of the **British Aluminium Co., Ltd.**, but retains his seat on the board. Mr. R. W. Cooper has been appointed chairman.

Mr. T. W. Davidson has resigned from the board of the **Home and Colonial Stores, Ltd.**, and also from the boards of the associated companies.

Mr. C. H. Williams, general manager, and Mr. E. A. Wrottesley, chief works manager, have been appointed directors of **Huntley and Palmers, Ltd.**

Mr. Irving A. Keene has resigned from the board of **Irving's Sea-Vitoids, Ltd.**

A final dividend of 7½ per cent. has been announced by **Hugon and Co., Ltd.**, manufacturers of "Atora" beef suet and lard, and exporters of canned fruit, meat, etc. This makes 10 per cent. for the year 1930, an interim dividend of 2½ per cent. having been paid in September last.

It has been announced by the directors of the **Lake of the Woods Milling Co., Ltd.**, that the dividend on the common stock, which in the ordinary course would have been payable on March 1, will not be paid. Flour milling companies operating in Canada have been retarded by the extremely difficult conditions, and without a doubt the immediate outlook demands some conservation of resources.

The agricultural depression has necessitated the passing of the dividend on the preferred stock of the **Massey-Harris Co., Ltd.**

Recently, Sir Richard J. Williams was appointed vice-chairman of **Morris and Jones, Ltd.**, and Mr. Hugh L. Roxburgh has accepted a seat on the board in place of Mr. T. R. Jones, deceased.

Mr. F. F. Charlton has been elected a director of the **Associated London Flour Millers, Ltd.**, and Mr. T. P. Aldred has been appointed secretary.

Captain L. M. Glasson has been elected a director of **M. B. Foster and Sons, Ltd.**

On February 9 last the petition to wind up **Sugar Beet and Crop Driers, Ltd.**, was adjourned for six weeks. The company was registered as a private concern in 1926.

A dividend of 9 per cent. has been announced by **Salt Union, Ltd.**, for 1930, as compared with 12½ per cent. for 1929.

STOCK AND SHARE LIST

	June, 1931.	*Par Value.*	*May*, 1931.
Aerated Bread: Ord. ...	19/-	£1	19/3
6½% Pref.	20/-	£1	21/9
Apollinaris: Ord.	4/1	£1	5/9
Assoc. Biscuit: 6½% Pref. ...	22/11	£1	23/3
Avery (W. and T.): Ord. ...	40/-	£1	44/-
5% "A" Pref.	4½	£5	4⅜
5½% "B" Pref. ...	20/-	£1	20/6
Benger's Food: Ord. ...	30/9	£1	31/6
6% Pref.	4⅞	£5	4⅞
Bovril: Ord.	22/9	£1	24/2
Deferred	30/-	£1	36/3
6% Pref.	22/6	£1	23/-
4½% Deb.	93	£100	91
British Aluminium: Ord. ...	25/6	£1	28/-
6% Pref.	19/3	£1	20/-
British Thomson Houston: 7% Pref.	23/9	£1	24/-
Bucknall (H.) and Sons: Ord.	22/-	£5	22/-
Cadbury: 6% Pref.	23/9	£1	24/-
8% 2nd Pref.	28/9	£1	29/-
Callard, Stewart and Watt: 6% Pref.	18/-	£1	18/-
Carrs: 6½% Pref.	21/-	£1	21/-
Cerebos: Ord.	5⅞	£1	5⅞
Chivers: 6% Deb.	102	£100	102
Cinzano: 7½% Pref. ...	20/2	£1	20/-
Clark's Bread: Ord. ...	22/6	10/-	22/6
Cow and Gate: 7½% Pref.	22/9	£1	22/9
Criterion Restaurants: Ord.	6/11	5/-	6/6
Crosse and Blackwell: Ord.	11d.	1/-	1/-
7½% Pref.	5/10	15/-	7/-
6½% Deb.	85	£100	88
Dutch Margarine: 5½% Pref.	21/-	£1	21/-
English and Dutch Meat: 8% Deb.	50	£100	50
Ewart and Son: Ord. ...	10/6	5/-	16/3
16% Pref.	19/6	10/-	19/6
Foster Clark: Ord.	42/-	10/-	42/3
Fry's: 8% "B" Preferred	22/3	£1	22/4
Fullers: Ord.	34/-	£1	34/-
7% Pref.	20/5	£1	18/9
Gordon Hotels: Ord. ...	7/6	£1	9/-
4% Perp. Deb.	68	£100	69
Grape Produce: 8% Ptg. Pf'd. Ord. ...	1/2	5/-	1/2
H.P. Sauce: Ord.	86/-	£1	92/-
Hill (W.): Ord.	7/-	£1	7/-
Holbrooks: Ord.	12/6	5/-	14/-
5% Pref.	4⅜	£5	4½
Home and Colonial: Ord. ...	13/6	4/-	14/-
15% Cum. Ord.	52/6	£1	49/-
6% Cum. Pref.	5¾	£5	5⅛
Honywood Hotels: Ord. ...	1/8	2/6	1/8
8% Pref.	15/-	£1	15/-
Hovis: 6% Cum. Pref. ...	23/8	£1	23/9
Imperial Chemical: Ord. ...	13/3	£1	15/-
Deferred	3/-	10/-	3/8
7% Cum. Pref.	20/-	£1	20/2
International Tea: Ord. ...	20/-	5/-	21/8
6% 1st Pref.	23/-	£1	23/6
7% "A" Pref.	24/6	£1	25/-
Jones (R. E.): Ord.	1/3	5/-	1/3
10% Pref.	6/4	£1	6/-
Jurgens: 7% Cum. Partg. Pref. ...	24/-	£1	23/9
Kia-Ora: Ord.	8/4	10/-	8/3
Liebigs: (Reg.)	8⅞	£5	11¼
(Bearer)	8⅞	£5	11¼
5% Pref.	95/-	£5	96/3
Lipton: Ord.	5/6	1/-	5/2
5% 1st Pref.	8/9	10/-	8/6
6% Pref.	10/9	10/-	10/6
6% Deb.	103	£100	102
Lovell and Christmas: Ord.	8/9	£1	11/3

	June, 1931.	*Par Value.*	*May*, 1931.
Lyons: Ord.	90/6	£1	93/-
"A" Ord.	90/3	£1	92/9
5% Pref.	21/-	£1	20/9
6% Preferred Ord. ...	23/2	£1	22/6
7% Pref.	27/6	£1	27/-
8% Pref.	30/3	£1	31/-
Manbre and Garton: D'f'd.	9/6	2/-	10/9
Mather and Platt: Ord. ...	22/-	£1	30/-
Maypole Dairy:			
20% Preferred	17/-	5/-	17/-
Deferred	4/3	2/-	4/5
5% Pref.	19/6	£1	19/9
Mazawattee Tea: Ord. ...	11/3	6/8	12/6
Meadow Dairy: 7½% Pref.	23/6	£1	24/4
Mellin's Food: 6% Cum. Pref.	1/10	£1	2/3
Molassine: 7% Pref. ...	12/6	15/-	11/3
Nathan (J.): Ord.	1/6	1/-	2/2
7% Pref.	15/6	£1	17/-
8% Preferred	7/6	10/-	7/10
Nestlés: 8% Pref.	30/9	£1	30/8
Parkinson and Cowan: Pref.	21/-	£1	21/-
Pascall (J.): 8% Preferred	5/-	£1	6/-
Peak Frean: 5% Pref. ...	18/2	£1	19/-
8% "A" Pref.	25/-	£1	26/-
Radcliffs Edible: Ord. ...	1/2	1/-	1/3
8% Pref.	6/10	10/-	7/-
Radiation: Ord.	30/6	£1	34/-
6% Pref.	21/9	£1	22/-
Rowntree: 7% 2nd Pref. ...	21/6	£1	21/8
Salt Union: Ord.	18/3	£1	22/6
7% Pref.	26/6	£1	26/-
4½% Deb.	84	£100	82
Schweppes: Deferred ...	20/6	£1	29/-
4% Deb.	76	£100	78
Scribbans: Ord.	13/4	£1	13/5
Deferred	1/8	1/-	1/8
Slaters and Bodega: Ord. ...	26/3	£1	26/8
6½% 2nd Pref.	21/6	£1	21/6
Smithfield and Argentine Meat:			
7½% Cum. Pref.	15/-	£1	16/9
Smith's Potato Crisps: Ord.	8/6	5/-	8/9
Spiers and Pond: Ord. ...	13/3	10/-	13/8
6½% Pref.	20/-	£1	20/2
5% Deb.	96	£100	97
Spillers: Ord.	25/9	£1	27/-
6% Pref.	21/9	£1	20/6
Deferred	9/11	£1	10/-
Strand Hotel: Pref'd. Ord.	65/-	£1	65/-
Tate and Lyle: Ord. ...	36/-	£1	36/3
6½% Pref.	24/2	£1	24/3
Trust Houses: Ord. ...	14/-	£1	14/-
Unilever: Ord.	30/-	£1	36/-
7% Preferred	24/8	£1	24/9
Union Cold Storage:			
6% Pref.	20/3	£1	20/-
7% Pref.	20/6	£1	20/2
10% Pref.	27/-	£1	26/9
United Caterers: Ord. ...	7½d.	5/-	7½d.
United Dairies: Ord. ...	32/9	£1	33/6
6% Pref.	22/6	£1	22/-
United Glass Bottle: Ord. ...	16/-	£1	16/6
Preferred	20/9	£1	21/-
United Molasses: Ord. ...	6/3	£1	7/9
6% Pref.	7/6	£1	8/11
Van den Berghs:			
15% Preferred Ord. ...	11/-	5/-	11/3
Victoria Wine: Ord. .	6/6	5/-	6/8

Unit Air Conditioners for Milk Storage Rooms

CERTAIN difficulties and shortcomings in the use of refrigerated wall coils for milk storage rooms are overcome by the use of unit air conditioners. A milk storage room requires the removal of a large amount of heat and moisture in a comparatively small space and short time.

Milk bottles and crates come from the washer at a high temperature and are very wet, and require in themselves a large proportion of the cooling capacity in the milk storage room. This heat must be removed rapidly and completely if the milk is to be held at about 40° F., which is close to its temperature when bottled; if crates and bottles are not cooled quickly they give up much of their heat to the milk, and bring it up to a temperature at which bacterial action increases excessively.

The dripping wet condition in most milk storage rooms is due to the water on crates and bottles coming from the washer, and from hot moist air leaking through the conveyor opening from the bottling room. Frequently, water drips from overhead coils, depositing rust on milk bottles and tops. These conditions are corrected by the use of the coil type air conditioner, which eliminates the overhead or wall coils and absorbs the excess moisture down to a point where a comparatively dry room is obtained. This moisture is deposited on the unit coils, and is readily removed by short shut-down periods for defrosting, provided for by automatic control and slightly oversize equipment, or by manual control of the refrigerant.

In order to obtain the necessary rapid cooling of crates, bottles, and milk, there are two requirements which must be fulfilled:

1. Sufficient refrigeration and cold air.
2. Rapid circulation of the cold air to all parts of the room.

The first consideration is of prime importance, and the cooling load must be figured carefully to include everything; otherwise, while the room temperature may be brought down to a satisfactory level, the crates and milk will not be cooled. The second consideration is just as important, because if the cold air is not circulated continuously down into the centre of the crate pile and to every portion of the room, the available refrigeration will not be utilised.

When milk bottles and crates are cooled rapidly, holding the milk temperature at about 40° F., the bacterial action is arrested in the milk, imparting better keeping qualities to the product. At the same time, the cream forms more quickly and a better cream-line is obtained.

The coil type air conditioner provides a better and more flexible control of the storage room, particularly so when a separate machine is used on the latter. A separate machine is usually to be recommended, because the general milk plant load comes during the day and falls off almost completely at night, while the storage room still needs refrigeration. This usually leaves a large machine operating on a comparatively small load.

Use of the coil type air conditioner results in quickly cooling the milk, keeping the bottles and crates clean and dry, and in eliminating fog.

L. F. E.

Cattle Industry of North Australia

THE report of the North Australia Commission last year, which has recently been made public, contains a recommendation for the extension of rail facilities to insure arrival of cattle at killing centres in better condition than is now the case after a trek of 1,000 to 1,500 miles across country to reach markets. Driving occurs in April after the cattle have been held on the runs for three months at a time of the year when animals have to battle the tick and the Buffalo fly, during which period the grass deteriorates in quality. Hence, under present conditions, large numbers of cattle arrive at slaughter points only to be graded as "stores," thus realising only about £4 a head on account of their condition.

Williamson's New Worcester Plant

AN important stage in the history of the English canning industry was marked by the opening last month, by Viscount Cobham, the Lord-Lieutenant of Worcester, of the new can-making plant of Messrs. G. H. Williamson and Sons, Ltd., at Perry Wood, Worcester. This factory is one of the sixteen associated works of the Metal Box Co., Ltd., and it is estimated that the new Williamson factory will be able to make about 100,000,000 cans in the year. A feature of the factory is the care taken to ensure that all machines should work at maximum efficiency. To this end "reservoirs" of cans are kept on conveyors in the various stages of the manufacture so that a temporary check in any one machine has the minimum effect on the operation of the whole plant. The new factory has a floor area of 100,000 square feet (the site covers nearly 20 acres), and is designed so that output can be trebled without altering the existing plant. Twenty-two different sizes can be produced, from the 3-oz. cream can to the A.10 or "gallon" can.

The Equipment.

The present output is equal to 1,200 cans per minute, and, as in other factories of the Metal Box Company, Messrs. Dewey and Almy's "Gold Seal" rubber lining products are being used. These include standard "Gold Seal" rubber lining compound for food cans, oilproof rubber lining compound for cans containing paints and oils generally, and "Gold Seal" cap compound for bottle caps. In addition to these, "Dewalco" crystal flux is used in the soldering baths of the high speed body makers. This flux, which is used for keeping the soldering roll clean and bright, is used as standard flux by many of the largest can manufacturing concerns, because of its uniformity and capacity for absorbing oxides.

A General View of the New Perry Wood Plant.

"A Signal of Hope."

Speaking at the luncheon given to celebrate the opening of the factory Mr. Williamson said that about five years ago there was no canning industry in this country, but on the occcasion of the second convention of the National Fruit Canning Council at Worcester some of those interested in the trade got together and the present movement was virtually conceived. Since then, with the help of the National Food Canning Council and the assistance of research stations, things had developed to such an extent that the company felt justified in building a factory devoted exclusively to the making of cans. Their new factory, of which they had reason to be proud, was equal to any of its kind in the world.

Lord Cobham, responding, said the new business was something more than a bold venture on the part of the people who built the works and something more than an addition to the industries of the old city. It was a signal of hope and encouragement to the vast industry of agriculture. Where was the limit to the business now open to them? The industry was only in its infancy. They looked to an even wider range of products including not only fruit and vegetables but the products of dairies and piggeries. The vast sum spent on tinned foodstuffs imported annually into this country had to be borne in mind in thinking of the future.

The Troyer-Fox Lining Machines which have been installed in these works, are very high speed machines, their output of can ends being 300 ends per minute each, and are, of course, suitable only for a firm who are able to keep each machine running on one size can end for weeks at a time. All of the six machines are running on Gold Seal. Messrs. Arthur Holden and Sons, Ltd.'s Super Zinnatine and Sulfatine are being exclusively used for the lacquer requirements of this important new plant.

New Companies (*concluded from opposite page*).

UNIQUE TEA COMPANY, LIMITED. (256365.) To carry on the bus. of mnfrs. and blenders of and dlrs. in tea, etc. Nom. Cap.: £1,000 in £1 shares. Dirs.: R. Pape, Thornville, Upper Wortley Road, Leeds; Mrs. I. Pape, Thornville, Upper Wortley Road, Leeds.

NAHUM AND ABOULAFIA (PRODUCE), LIMITED. (255621.) To carry on the bus. of importers and exporters of and dlrs. in cocoa, cocoa-beans, coffee, tea, rubber, and other produce, etc. Nom. Cap.: £100 in £1 shares. Dirs.: to be appointed by the subs. Qual. of dirs.: none required. Remun. of dirs.: as voted by the co.

Current Literature

Fruit and Vegetable Products

193. Retaining the Tomato Vitamins. E. F. Kohman. (*Glass Packer*, 1931, June, p. 266.)

194. The Vitality of Yeast and the Keeping Quality of Fruit Juice Ferments. W. V. Cruess. (*Ibid.*, p. 277.)

195. Cold Packing Berries. J. C. Burtner. (*Canner*, 1931, May, p. 11.)

196. Bean Varieties for Canning. W. T. Tapley. (*Ibid.*, p. 13.)

Cereal Products

197. Salad Oil from Maize. M. M. Durkee. (*Food Industries*, 1931, June, p. 251.)

Dairy Products

198. Refrigeration in Milk and Cream Distribution. K. W. Ranney. (*Food Industries*, 1931, June, p. 244.)

199. Effect of High Temperatures in the Processing of Ice-Cream. C. D. Dahle and G. S. Barnhardt. (*Ice-Cream Tr. Journ.*, 1931, No. II., p. 41.)

200. Preparation of Acidophilus Milk from Milk treated by Electricity. E. D. Devereux. (*Am. Journ. of Pub. Health*. vol. 20, p. 1009.)

Miscellaneous

201. Trends in Distribution Organisation and Method. F. P. Valentine. (*Food Industries*, 1931, June, p. 259.)

202. Canning Tests prove Presence of Thermophiles in Sugar. E. J. Cameron and J. Yesair. (*Ibid.*, p. 265.)

203. Corrosion of Tinplate Containers. E. F. Kohman. (*Ibid.*, p. 266.)

204. Lime Precipitation in Sugar Manufacture. E. Saillard. (*Comptes Rendues*, 1931, January, p. 178.)

205. Glass Storage Containers for Pulp. H. A. Barnby. (*Glass Packer*, 1931, June, p. 265.)

206. Standard Vanilla and Vanillin Compared. E. J. Shanley. (*Ibid.*, p. 280).

207. Mayonnaise Comparisons. L. B. Kilgore. (*Ibid.*, p. 281.)

208. Deterpenisation of Essential Oils. Dr. A. Katy. (*Ibid.*, p. 284.)

209. Vintage Flavours without Alcohol. H. Bennett. (*Fruit Products Journ.*, vol. 10, p. 41.)

Analysis

210. Detection of Preserved Eggs. J. R. Nicholls, B.Sc., F.I.C. (*Analyst*, 1931, June, p. 383.)

211. Determination of Soluble Solids in Jams, etc. T. Macara. (*Analyst*, 1931, June, p. 391.)

212. Detection of Added Water in Milk. G. W. Monier Williams. (*Ibid.*, p. 398.)

213. Cause of Beet Odour or Taste in Milk and Butter. P. Zost. (*Z. u. Lebensm.*, 1931, 61, p. 171.)

214. Organic Acids in Honey. (*Ind. Eng. Chem.*, 1931, 23, p. 335.)

215. Thermophilic Bacteria in Milk. M. Christian. (*Nature*, 1931, 127, p. 558.)

216. Chemistry of Vitamin B_2. B. C. Guha. (*Ibid.*, p. 594.)

New Companies

LONDON TEA AND PRODUCE COMPANY, LTD. (256763.) To carry on the bus. of mchts., dlrs., and brokers in tea, rubber, coffee, etc. Nom. Cap.: £200 in £1 shares. Permt. dirs.: S. J. Griggs, 9, Arundel Terrace, Brighton; S. J. Griggs, jnr., 9, Arundel Terrace, Brighton; J. W. Alston, Motts Croft, Trapps Hill, Loughton.

SESSILE TEA COMPANY, LIMITED. (256959.) To carry on the bus. of prospectors, planters, and cultivators of tea, coffee, and agricultural products, etc. Nom. Cap.: £200 in 320 ord. shares of 5s. and 120 pref. of £1.

J. GENT AND SON (BEDFORD), LIMITED. (257001.) To take over the bus. of mineral water mnfrs. cd. on by Louisa A. and F. H. Gent at Bedford. Nom. Cap.: £2,000 in £1 shares. Dirs.: Louisa A. Gent, 128, Castle Road, Bedford; F. H. Gent, 10, Linden Road, Bedford (mang. dir.).

DAVID PEACHEY AND COMPANY, LIMITED. (256996.) Shanghai House, 8, Botolph Lane, E.C. 3. To carry on the bus. of mchts. and/or dlrs. in dried or other fruits, tea, coffee, cereals, etc. Nom. Cap.: £1,500 in £1 shares (1,000 pref. and 500 ord.).

SAYERS (CONFECTIONERS), LIMITED. (255846.) 13/17, Aintree Road, Bootle, Lancs. To take over the bus. of a baker and confectioner cd. on by F. J. Sayer at Bootle. Nom. Cap.: £15,000 in £1 shares.

C. ARTHY, LIMITED. (256412.) To take over the bus. of a baker, confectioner, and caterer cd. on by C. Arthy at Forest Gate, Manor Park, East Ham and Barking. Nom. Cap.: £5,000 in £1 shares (2,000 pref. and 3,000 ord.). Dirs.: C. Arthy, 12, Mornington Villas, Aldersbrook Road, Wanstead (permt. mang. dir.); E. S. Arthy, 12, Mornington Villas, Alderbrook Road, Wanstead.

FOOF, LIMITED. (256329.) 133, Sentinel House, Southampton Row, W.C. 1. To take over the bus. of a mnfr. of and dlr. in a sweetmeat known as "Foof" cd. on at Sentinel House, W.C. 1, including the trade mark. Nom. Cap.: £1,500 in £1 shares.

LLOYD GARNER AND COMPANY, LIMITED. (256312.) To carry on the bus. of dlrs. in and mnfrs. of articles of household use or ornament; storekeepers, bakers, grocers, etc. Nom. Cap.: £500 in 400 "A" shares of 5s. and 400 "B" of £1.

COCKETT FRUIT FARMS, LIMITED. (256350.) To take over the bus. of a fruit grower cd. on by A. Cockett at Walsoken and Walpole, Norfolk, as "Alfred Cockett." Nom. Cap.: £22,000 in 20,000 pref. shares of £1 and 40,000 ord. of 1s.

CHAMPAGNE HENRIOT (ENGLAND), LIMITED. (256349.) To carry on the bus. of wine, beer, and spirit mchts., etc. Nom. Cap.: £100 in £1 shares.

SPECIALIST EGG FARMS, LIMITED. (255848.) To carry on the bus. of dlrs. in and producers of eggs, poultry, dairy, farm, and garden produce, etc. Nom. Cap.: £1,500 in £1 shares. Dirs.: E. D. Phare, address not stated; H. W. Back, Hill House, Hethersett, Norfolk; A. K. Speirs Alexander, Spixworth, nr. Norwich; Lt.-Col. H. L. Cooper, address not stated; Capt. H. Piers Clarke, address not stated; R. Morton, address not stated.

SOUTH AFRICAN WINE FARMERS' ASSOCIATION (LONDON), LIMITED. (225701.) To enter into an agmt. with Vine Products, Ltd., and Ko-operatieve Wijnbouwers Vereeniging van Zuid Afrika Beperkt (Co-operative Wine Growers Association of South Africa, Ltd.); and to carry on the bus. of brewers, grape and vine mchts., wine and spirit mchts., bottlers, etc. Nom. Cap.: £95,000 in 45,000 preferred ord. shares of £1 and 400,000 deferred shares of 2s. 6d. Dirs.: to be appointed by the subs. Qual. of dirs.: £100 shares of either class. Remun. of dirs.: £200 each per annum (ch. £200 extra).

INCOMPARABLE YEAST COMPANY, LIMITED. (256876.) To carry on the bus. of importers, exporters, and mnfrs. of and dlrs. in yeast, etc. Nom. Cap.: £100 in £1 shares.

VALSECCHI AND COMPANY, LIMITED. (255822.) To carry on the bus. of provision mchts. formerly cd. on by Madeleine Valsecchi at 7, Battle Bridge Lane, S.E. 1. Nom. Cap.: £1,000 in £1 shares.

(*Concluded at foot of opposite page.*)

Trade News

Rubber Rings for Food Preserving.

In connection with the preserving of potted meats and pastes, the blackening of tin caps has been a source of worry and loss to manufacturers of these products. The rubber ring constitutes a most important part of an airtight closure, as without its aid a hermetic seal is impossible. The proper composition of these rings requires great experience and skill, especially in connection with the sulphur used in compounding, to obtain not only proper vulcanisation of the rubber, but also in regard to the excess of free sulphur which is resultant after vulcanisation.

The Poppe Rubber and Tyre Co., of Twickenham, who have specialised in the manufacture of rubber rings for the past quarter of a century, have produced a quality, in consultation with some leading food analysts and rubber experts, which approaches an ideal, in so far as the free sulphur content is concerned, of under 0·5 per cent. At the same time they have also been able to eliminate certain chemicals in their special compound which might in the least respect be held likely to interfere with the tin, as such, or the contents of the food under process. More particularly they have been able to exclude sulphur sulphide and antimony sulphide in the red and white qualities, and in the latter especially, iron oxide also. This quality is standardised as follows: T.P. No. 1, *Red* for Phœnix caps and flat tin caps, and T.P. No. 1, *White* for potted meats, tongues in glass, etc.

* * *

"Collabrac" for Chocolate.

Messrs. A. Boake, Roberts and Co., Ltd., have issued a most informative leaflet concerning some aspects of chocolate manufacture and the use of "Collabrac," which contains about 60 per cent. lecithin and is free from any tendency to rancidity on keeping. The chief use of "Collabrac" is to effect a saving in cocoa butter; tests show that with 0·5 per cent. of the compound there is a saving of about 8 per cent. cocoa butter. Also, cocoa butter weakens the flavour of the chocolate—*e.g.*, in Easter eggs, which may contain 40 per cent. cocoa butter, thus imparting a greasy taste. By the use of 0·5 per cent. "Collabrac," eggs can be readily moulded with 32 to 33 per cent. fat, which gives a full chocolate flavour and a good colour, and also reduces the possibility of the chocolate becoming rancid and the development of "force marks."

The purchaser of "Collabrac" is licensed to use it under patents Nos. 328,075 and 330,450.

Readers will find in the leaflet a very interesting and instructive account of the theory of the consistency of chocolate and the part played by cocoa butter in relation to the cocoa particles and sugar particles suspended in it. It is upon the ease with which these particles can move that the consistency of the chocolate depends. Each particle is surrounded by a layer of the butter, because of adhesion, and moves with it, thus forming a lubricated surface. Reasons are given for the difference in behaviour of cocoa and sugar particles. The method of grinding also plays an important part. All these points are explained very clearly.

* * *

Tasmania to Can Crayfish.

The canning of crayfish is a recent development in Tasmania. This new product, which is similar to the American lobster, may offer severe competition to imported Japanese and American canned crab and lobster in the local market, according to information furnished by Trade Commissioner S. R. Peabody at Melbourne. It is protected by a duty of approximately 2½d. per pound, which is sufficient to allow it to sell, retail, under the price of imported crab meat. At the present time the white Australian crayfish retails at approximately 1s. 3d. per 8-oz. tin, while the Japanese article retails for approximately 1s. 4d. for the same size tin.

The total arrivals of bacon into the United Kingdom for the first three months of 1931 amounted to 2,574,312 cwts., as compared with 2,081,717 cwts. in the same period of last year. Of the total quantity imported during the three months period this year, Denmark contributed 1,781,884 cwts., as compared with 1,291,716 cwts. during the same period of 1930, while imports from the United States decreased from 209,927 cwts. in 1930 to only 65,119 cwts. this year. Imports of bacon from Canada and the Irish Free State also decreased considerably this year when compared with last.

* * *

Condensed Milk Regulations in Honduras.

An ordinance dated March 26, 1931, amends the British Honduras Milk and Cream Ordinance (Chapter 60 of the Consolidated Laws of 1924) by reducing the milk fat requirement of condensed milk from 9 per cent. to 8 per cent. by weight of milk fat. A further provision gives the Governor in Council authority to prohibit, either wholly or subject to such conditions as he may prescribe, the importation of any particular brands of milk and cream into British Honduras. A fine of not exceeding £50 is imposed for violation of this prohibition, and any milk and cream so imported is liable to seizure and forfeiture.

* * *

Japanese Canned Crab Industry during 1930.

The merger of five companies, aided by efforts of the Japanese Ministry of Agriculture, engaged in the canned crab industry in a joint investment enterprise, was one of the most significant events in crab canning during 1930, according to information in a report from Tokyo, Japan. Canned crab production along the eastern coast of Kamchatka amounted to 196,000 boxes during 1930, but, in order to maintain high prices, production for 1931 will be curtailed. The amount of production on the western coast also will be reduced in 1931 from 320,000 boxes by 13 ships to 197,000 boxes by 10 ships. Six floating canneries to be reduced to only two for 1931.

Exports of Japanese canned crab meat for 1930 totalled 382,879 cases, valued at 15,320,000 yen (£1,151,339). Details of exports from various ports, compared with the two preceding years, are given below:

	1930.	1929.	1928.
	(In Cases.)		
From:			
Yokohama ...	345,729	378,769	489,613
Kobe	7,246	4,949	3,091
Osaka ...	18,559	6,332	1,330
Hakodate ...	11,345	9,383	14,880
Total ...	382,879	399,433	508,914

The following table shows exports according to destination:

	1930.	1929.	1928.
	(In Cases.)		
To:			
England ...	101,373	91,300	163,120
United States	215,614	230,905	284,718
Canada ...	5,038	5,814	5,393
Hawaii ...	3,838	3,202	3,882
Australia ...	15,654	23,935	18,212
France ...	26,647	12,767	10,447
Germany ...	971	4,333	3,949
Denmark ...	4,340	8,156	7,934
Others ...	9,404	15,674	11,249

The Mitsubishi Shoji Kaisha virtually controls the production and sales of canned crab in Kamchatka. Out of the total output of canned crab amounting to 569,000 cases, this company sold 295,000 cases produced by the Showa, Yagi, Hayashikane, and Nichiro Fisheries. The Mitsubishi have contracted with these floating and shore canneries for their production for the next ten years. The floating cannery is an innovation of importance in the history of crab canning. In the early days of the crab industry the crab was caught off the coast of Hokkaido and Karafuto and packed on land. The efforts to overcome the limitation in production necessitated by this method led to the development of the floating canneries. The canneries go to the famous fisheries in the waters off Kamchatka, and catch and pack the crabs on the spot. These floating canneries to-day produce more than 70 per cent. of the total output in Japan, and their products are preferred because of their great freshness.

Tomato Canning in New Zealand.

There is every possibility of a new tomato-packing industry starting at Thames (N.Z.) shortly, according to information furnished in a report from Wellington, New Zealand. It is proposed to erect pulping works to use the large amount of tomatoes that are not sent to the market and go to waste. It is contended that when crops are heavy a glut in the market is created, and the growers are forced to accept a price that does not pay them. The sauce manufacturers can only account for a limited quantity, as they have their constant sources of supply from growers who cater for this special market alone.

It was suggested at a meeting of growers that the most equitable basis would be that of a co-operative company, which would take the surplus crops and pulp them, and manufacture tomato soups and also the tinned tomato, which finds a ready sale. It was declared that there was not only a good New Zealand market, but the possibility of an export market.

* * *

Some idea of the growth in both importance and size of the Imperial Fruit Show, which is held annually each October, may be gauged from the fact that there are now only four cities in the British Isles with buildings vast enough to house this ambitious exhibition. The eleventh annual Imperial Fruit Show will be staged concurrently with the Canning Exhibition this year in the City Halls, Manchester, which are being specially enlarged for the occasion. The show has the active support of the Empire Marketing Board, the Ministry of Agriculture and Fisheries, the National Food Canning Council, and all the Dominion and Colonial Governments. The 1931 exhibition promises to completely eclipse all its predecessors, and will introduce many new features of paramount importance to both trade and the general public.

A large section will be devoted to exhibits by fruit growers and producers of canned fruit, dried fruit, and honey. Incidentally, this is the first occasion on which honey has been included, and already the classes provided are well supported by the home and Dominion beekeepers. Readers who are contemplating exhibiting or participating in the classes for growers should make early application for details, which can be obtained from the Imperial Fruit Show Offices, 5, Bloomsbury Square, London, W.C. 1.

Correspondence

FOOD FADS AND THE WIRELESS

To the Editor.

DEAR SIR,

Your paragraph in the June issue of FOOD MANUFACTURE prompted us to write to the B.B.C. suggesting that a talk on the desirability as a food of white bread should be given in order to preserve their reputation for fairness in the case of controversial matter of this sort. We have received the following letter in reply and think it will interest you to see it.

Yours faithfully,
(for the British Arkady Co., Ltd.)
F. E. THOMAS.

F. E. THOMAS, ESQ.

DEAR SIR,

I have to acknowledge your letter of June 8 with reference to Mr. Evelyn Wrench's recent talk in the series "The Art of Cooking."

This was, of course, an individual expression of opinion by Mr. Wrench, and was not intended in any way to be a foundation of a case against white bread. We know, of course, that dieticians hold some quite contrary views on this question of white *versus* brown bread, and in many of the talks in our household series the advantages of white bread have been similarly brought forward.

Some of the best known of our speakers on dietetics, such as Professor V. H. Mottram, of King's, and Professor S. J. Cowell, of St. Thomas's Hospital, have in the course of their talks emphasised the fact that in a complete mixed diet white bread is not only easier for most people to use as regular diet, but is equally good from a health point of view.

This question of varying schools of dietetics is, of course, a somewhat difficult one, because, as you know, in the present stage of scientific investigation various scientists hold different views, but we are always most careful, in presenting these views, to give them as the individual opinion of the speaker and not in any way endorsed by ourselves.

I may say, however, that in the Housewives' News, which we arrange in collaboration with the Ministry of Agriculture and the Empire Marketing Board, and which is broadcast every Tuesday morning at approximately eleven o'clock, we have frequently emphasised the excellent qualities of such British products as Yeomen and other flours suitable for making white bread, cakes, etc.

Yours faithfully,
THE BRITISH BROADCASTING CORPORATION.

SAVOY HILL, LONDON, W.C. 2.
June 10, 1931.

LITHOGRAPHED CANS

To the Editor.

DEAR SIR,

Mr. Maytham is a bonny fighter, and in his letter in the April issue of FOOD MANUFACTURE he undoubtedly handles the opposition case with ability, although I have never suggested that there were not quite good arguments against the use of a lithographed can for processing in this country. I pointed out that the glossy finish of the paper label could not at present be matched, that drastic alterations in designs might be necessitated, and that in this country the whole matter was in the experimental stage.

The difficulty Mr. Maytham mentions of variable requirements owing to weather conditions is quite true, and in my opinion is the principal objection against the use of the lithographed processing tins here. There is also the damage likely to be done to the decoration of the tin during handling, processing, etc., and I agree with Mr. Maytham that a lithographed can after processing does not always look as "nice" as a paper labelled one. This treatment is sometimes very drastic, and it is not impossible to find tins where not only the lacquer but the tin itself has been completely scraped or rubbed off.

Undoubtedly a lot of things will have to be improved before the lithographed process tin becomes a practical possibility, but, to paraphrase Lytton, "in the lexicon of youth which fate reserves for a bright manhood, there is no such word as 'impossible.'"

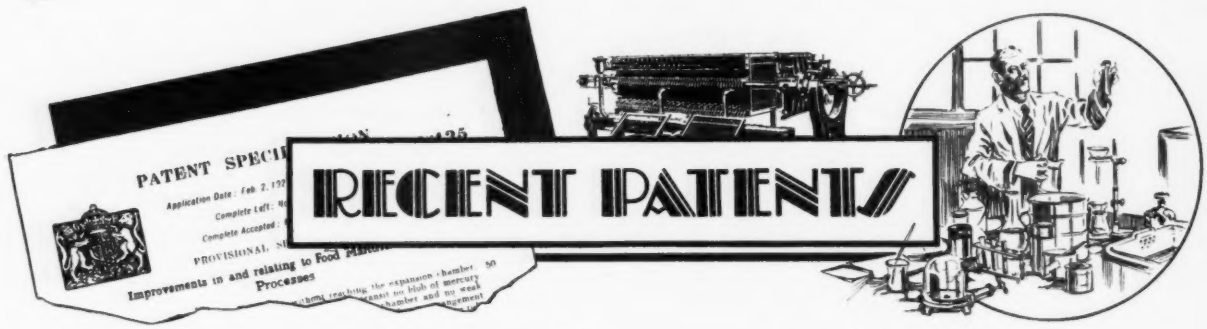
The canning industry at present is in its youth, and who shall say what possibilities in all its departments may not be hidden in the future?

As to the relative costs, and Mr. Maytham's humorous query as to the prices my firm charged him when he was a tin printer—well, he places me in a difficulty. All I can say is that, had we known Mr. Maytham then as well as we do now, we should probably have charged him under cost; he is so amiably persuasive. Like Mr. Maytham, I have no axe to grind, and in all these discussions one thinks of personal gain last, if at all, and tries to treat the question only from an academic, scientific, and practical standpoint.

The lithographed can is certainly used on the Continent and in America; whether it is practicable in this country is debatable. Mr. Maytham says it is not, and, as at present advised, I am inclined to agree with him.

Yours faithfully,
A. LL. MATTHISON.

BIRMINGHAM,
April 21, 1931.



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Latest Patent Applications

14736. CHEMISCHE FABRIK J. A. BENCKISER GES. and DRAISBACH, F.: Method of producing crustless cheese. May 19.

15161. POZNANSKI, A.: Method of presentation of edible products. May 22.

14194. DOPHEIDE, L.: Means for moulding butter. May 13.

14487. GATES, W. R. B. ST. J. and TAVROGES, J.: Milk foods. May 15.

14119. MANNION, O.: Food preparation. May 13.

Specifications Published

348,698. LINDNER, P.: Flavouring foods.

348,208. ROBERTSON, D.: Chilling and freezing of fish and other foodstuffs.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts Published

342,098. **Cheese.** APLIN AND BARRETT AND WESTERN COUNTIES CREAMERIES, LTD., and OTTIKER, A. E., Chedlet Factory, Westbury, Wiltshire.

To improve the texture, cheese, after being ground, is forced in the cold state or after heating to a temperature below the melting point, and preferably not exceeding 100° F., into a high-speed disintegrating machine wherein the cheese mass is caused to travel in the form of a very thin film between surfaces moving relatively to one another at a very high velocity. The disintegrating machine may comprise a rotor of about fourteen inches diameter revolving at about 6,000 revolutions per minute, the rotor being formed with radial passage through which the cheese mass, introduced into the machine at a central position, is fed outwards by centrifugal force and is then caused to pass through a clearance space of from ·015 to ·003 of an inch between the periphery of the rotor and a stator ring or casing. The ground cheese may be fed to the inlet of the machine by a feeding-worm or helix. The treated cheese may be subsequently pasteurised without causing fat to separate, either without the use of emulsifying agents or with the use of a less quantity than usual.

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Recent Trade Marks

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"WE TWO."—518,363. **Condensed and sterilised milk, cream, and tinned butter.** AKTIESELSKABEK DEN DANSKE MAELKEKON-DENSERINGSFABRIK, Vejlebrogade, Nakskov, Denmark. June 4.

LUCKY.—519,953. **Milk chocolate.** BRITISH MERCHANTS INCORPORATED, LTD., 32, Lime Street, London, E.C. 3. June 4. (By Consent.)

CHANTICLEER.—521,704. **Hams and lard (for food).** I. BEER AND SONS, LTD., 15, King Street, West Smithfield, London, E.C. 1. June 4. (Associated.)

SNOWFLAKE.—520,639. **Salt for food.** THE SALT UNION, LTD., Colonial House, Water Street, Liverpool. June 4.

NATEINA.—521,166. **A dietetic preparation (not medicated) for invalids.** LLOPIS HERMANOS, 12, Paseo de Rosales, Madrid, Spain. June 4. (Associated.)

GOLDEN PASTURES.—521,081. **Butter and cheese.** A. G. MASTERS AND CO., LTD., 177 to 185, Hackney Road, London, E. 2. June 4.

GOLDEN SUNSET.—521,195. **Butter and cheese.** A. G. MASTERS AND CO., LTD., 177 to 185, Hackney Road, London, E. 2. June 4.

ADVANCE.—517,897. **Meats, soups, fruits, vegetables, fish, and chicken, all being canned goods or being packed in glass containers, and bacon, hams, lard (for food), cheese, butter, and sausages.** WILSON MEATS, LTD., 24, Sir Thomas Street, Liverpool. May 27.

SNOVERT.—519,472. **Sugar, syrups (not alcoholic and not medicinal), and treacle.** MACFIE AND SONS, LTD., 34, Moorfields, Liverpool. May 27.

PASTURE.—520,587. **Biscuits.** BEE BEE BISCUITS, LTD., Sutherland Road, Blackpool. May 27. (By Consent.)

VITASUGAR.—521,494. **A powder composed chiefly of sugar for use as an addition to milk to prevent curdling.** MARJORIE HELEN SAUNDERS, 129, Wakemans Hill Avenue, Kingsbury, London, N.W. 9. May 27.

TASAM.—522,190. **Fish.** GEORGE TABOR, LTD., Imperial House, Pudding Lane, Billingsgate, London, E.C. 3. May 27.

SELA.—521,136. **Sugar confectionery.** THOMAS ERNEST ROBERTS, 19, Hope Street, West Bromwich. May 27.

MELEK. — 520,608. **Dried fruits.** CO-OPERATIVE WHOLESALE SOCIETY, LTD., 1, Balloon Street, Manchester. May 20. (By Consent.)

CHANTICLEER.—519,969. **Cream and preserved, condensed, and sterilised milk.** I. BEER AND SONS, LTD., 15, King Street, Snow Hill, London, E.C. 1. May 20. (Associated.)

FREBIS.—521,472. **Edible fats.** THE PEERLESS REFINING CO. (LIVERPOOL), LTD., 49 to 59, Cheapside, Liverpool. May 13. (By Consent.)

CAEGLAS.—521,827. **Butter and cheese.** REGINALD JOSEPH GORDON SHUTE, trading as EDEN J. SHUTE, The Butter Factory, New Road, Gillingham, Dorset. May 13.